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THE MANUAL

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THE MANUAL

TABLE OF CONTENTS

CHAPTER ONE:
Introduction

WHAT IS PHOTON PAINT? 1.1
ABOUT THIS MANUAL 1.3

CHAPTER TWO:
Getting Started

SYSTEM REQUIREMENTS 2.1
LOADING THE PROGRAM 2.1

CHAPTER THREE:
The Project Menu

CLEAR 3.1
LOAD 3.2
SAVE 3.5
SAVE AS 3.5
SAVE ANIM 3.5
DELETE 3.7
PRINT 3.7

FAST MENU 3.10
BASE COLORS 3.10
From Brush 3.13
From Next Page 3.13
Restore 3.13
Default 3.13
Current 3.13
Affect Picture 3.14
Remap Picture 3.14
Restore Palette 3.14
Default Palette 3.14
ALTERNATE 3.14
Next Page 3.15
Previous Page 3.15
Go To Page 3.15
Insert Page 3.15
Append Page 3.15
Exchange Pages 3.16
Delete This Page 3.16
Delete All Pages 3.16
Copy To Next 3.16
Merge To Next 3.17
Animate 3.17
FONT 3.18
Load 3.18
Italic 3.19
Bold 3.19
Underline 3.20
Outline 3.20
Reverse 3.20
Free 3.20
VIDEO 3.21
ABOUT 3.21
QUIT 3.21

CHAPTER FOUR:
The Fast Menu And The Color Palette

THE FAST MENU 4.1
TOOLS AND GADGETS ON THE FAST MENU: 4.2
The Brush gadget 4.2
Note: Background and Foreground Colors 4.2
The Free Draw Tool 4.4
The Free Shape Fill Tool 4.4
The Dotted Free Draw Tool 4.5
The Airbrush Tool 4.5
The Lines Tool 4.6
The Filled Polygon Tool 4.6
The Arc Tool 4.7
The Hollow/Filled Rectangle Tool 4.8
The Hollow/Filled Ellipse Tool 4.9
The Hollow/Filled Circle Tool 4.9
The Text Tool 4.9
The Fill Tool 4.12
Background Fill 4.13
Boundary Fill 4.13
Free Shape Fill 4.13
Polygon Fill 4.14
The Magnification Tool 4.15
Resizing 4.15
Scrolling 4.15
Changing The Degree Of Magnification 4.15
The Scissors Tool 4.16
The Lasso Tool 4.16
The Polygonal Brush Cutting Tool 4.16
The Restore Previous Brush Tool 4.18
The Undo Gadget 4.18
The Pix Tool 4.19
LOCATING THE COLOR PALETTE 4.19
THE EXTENDED FAST MENU 4.19

SELECTING A SET OF COLORS: 4.20
Foreground and Background Colors 4.20
The Color Selection Squares 4.20
The RGB Sliders 4.20
The HSV Sliders 4.21
MIXING COLORS 4.21
CREATING A SPREAD OF COLORS 4.21
The RGB Spread Gadget 4.22
The HSV Spread Gadget 4.22
THE COPY GADGET 4.22
THE SWAP GADGET 4.22
THE ALPHA-NUMERIC COLOR READOUTS 4.23

CHAPTER FIVE:
The Preferences Menu

SCREEN MODE 5.1
NTSC 5.1
PAL 5.1
Interlace 5.1
Overscan 5.1
EXACT COLOR 5.2
KEEP UNDO 5.2
KEEP BRUSH 5.2
FAST BRUSH 5.2
CLEAR TO FIRST 5.3
LOAD PROMPTING 5.3
COORDINATES 5.4
WORKBENCH 5.4
FOLLOW MOUSE 5.4
MOUSE SPEED 5.5
SCREEN OFFSET 5.5
SAVE PREFS 5.5

CHAPTER SIX:
The Brush Menu

LOAD 6.1
SAVE AS 6.3
TRANS 6.5
SOLID 6.6
FLIP 6.6
RESIZE 6.6
Free 6.6
Double 6.7
Double Horiz 6.7
Double Vert 6.7
Halve 6.7
Halve Horiz 6.7
Halve Vert 6.7
ROTATE 6.7
Free 6.7
+90 ..... 6.8
-90 ..... 6.8
180 ..... 6.8
WRAP ON 6.8
Tube 6.8
Cone 6.9
Ball 6.9
Ellipse 6.9
Free 6.10
Cube 3/4 ..... 6.11
Cube * 3 ..... 6.11
Contour 6.11
SPECIAL 6.13
Bend 6.13
Stretch 6.14
Twist 6.14

Tilt 6.15
Pitch 6.15
Roll 6.15
Yaw 6.15
Distance 6.15
Shift 6.16
Luminosity 6.17
Lum On 6.17
Intensity 6.17
Contrast 6.18
Dither 6.18
Full Scale 6.18
Direction 6.19
Backlight 6.19
Fine Shade 6.20
Remap 6.20
Free 6.21

CHAPTER SEVEN:
The Special Menu

CYCLE DRAW 7.1
STENCIL 7.1
On/Off 7.2
Define 7.2
Invert 7.2
GRID 7.3
On/Off 7.3
Define 7.3
SHADOW 7.4
On/Off 7.4
Define 7.5
Relative 7.5
Define Base Size 7.5
Hints 7.6

CHAPTER EIGHT:
The Mode Menus

NORMAL 8.1
BLEND 8.1
Set 8.1
Swap And Copy Gadgets 8.3
Ignore Gadgets 8.3
Dither 8.4
Background and Gradient 8.4
Curve 8.4
Average and Minimum 8.5
ADD 8.5
SUBTRACT 8.6
MAXIMUM 8.6
MINIMUM 8.7
USE H 8.7
USE H & S 8.8
AND, OR AND XOR 8.8
And 8.8
Or 8.8
Xor 8.9
SOURCE 8.9
Color 8.9
Pattern 8.10
Panto 8.10
Set 8.11
Under 8.12

CHAPTER NINE:
Tutorials

BLENDING A BRUSH 9.1
USING PERSPECTIVE 9.5
3-D SURFACE MAPPING 9.7
THE BALLOON TUTORIAL 9.10

DOCTORING A DIGITIZED PHOTOGRAPH 9.18
SAVING YOUR WORK 9.27
THE ANIM TUTORIAL 9.27

APPENDIX A:
Technical Addendum A.1

KICKSTART/WORKBENCH COMPATIBILITY A.1
THE "CONSTRAIN" FUNCTION A.1
INSTALLING PHOTON PAINT ON A HARD DISK A.1
BOUNDARY FILL OF LARGE AREAS A.2
A NOTE ON CONTOUR MAPPING A.3

APPENDIX B:
What To Do When You Run Out Of Memory B.1

APPENDIX C:
System Messages C.1

ERROR, WARNING AND INFORMATION MESSAGES C.1
VERIFICATION MESSAGES C.6

APPENDIX D:
Photon Paint's File Format D.1

APPENDIX E:
The Anim File Format E.1

APPENDIX F:
Keyboard Commands F.1

1 Introduction

WHAT IS PHOTON PAINT?:

PHOTON PAINT is a full-featured Hold And Modify (HAM) painting program for the Commodore Amiga line of computers. It specifically utilizes the unique HAM protocol, which allows all of the possible 4096 colors accessible on the Amiga to be used on screen at one time.

Multiple pages can be created and animated "real time" on the screen. Special painting tools designed to facilitate the creation of animation sequences have been incorporated in PHOTON PAINT, so that this program can be used to produce animated scenes for use with our animation playback and sound synchronization program, CEL ANIMATOR.

Many of the features and techniques associated with other popular Amiga paint programs are combined within PHOTON PAINT, including those previously limited to EITHER a 32 color paint program, OR a HAM paint program; for example:

- Real-time operation of freehand drawing tools.
- The ability to paint in exactly the chosen color, regardless of background color, and to choose between painting the exact color, or allowing HAM to modify it according to the background and adjacent colors.
- Four types of fill functions: the standard Flood Fill, which fills all adjoining pixels of the selected color area; Boundary Fill, which enables the user to fill an area surrounded by a specific color: Free-shape Fill which allows you to outline a free-hand drawn shape to be filled; and Polygon Fill, which allows you to outline an area to be filled using a series of straight lines. Each allows you the option of using customized foreground and/or background drawing mode "setups."
- All popular brush operations, including Flipping, Resizing, Rotating, and Tilting (perspective).
- Blend Mode, allowing blending of a brush or shape with the background, and smooth, dithered shading.
- Rub Through, which allows pixels from an underlying spare page or subsequent page to be brought into the current page.

- Pattern, allowing you to create a pattern out of any current pic-brush; functioning with all drawing tools.
- Stencil, protecting areas you do not want to alter while painting.
- Hue Mode, allowing you to replace only the Hue of the underlying color with that of the applied color; this enables you to change only the actual color without altering its tonal qualities.
- H & S Mode allowing the replacement of both the Hue and the Saturation component of the underlying color with that of the applied color; this enables you to colorize black and white pictures.
- Three available methods of cutting a brush from the screen: Rectangular, Free-hand (Lasso) and Polygonal.
- An Airbrush tool, which also works with color cycling.

Some additional features UNIQUE to Photon Paint include:

- A functional Pantograph, enabling you to copy portions of a picture without having to surround them as a brush.
- Separate drawing Mode and Source "setups" for BOTH the Foreground Color (left mouse button) AND the Background Color (right mouse button).
- The ability to create a series of Alternate Pages in either of the two HAM screen resolutions, and animate them on the screen "real time."
- The ability to move the menu containing the brush gadgets and Color Palette up and down the screen, or remove it entirely during painting operations; recalling it from the menu bar, or from the keyboard.
- Reducing the size of the Brush and Color Palette Menu during work by selecting a toggle gadget which alternately removes and replaces the lower (color palette) portion.
- More sophisticated brush operations, including twisting, adjustable transparency, and mouse operated perspective tilting.
- Wrapping of brushes onto 3-D objects: both geometric shapes and asymmetric free-hand drawn shapes (surface mapping), with optional light-source

specification; setting of optional light-source intensity, and adjustable dithering of light-dependent shading.

- Use Amiga fonts with specified light source shading; dithering; 3-D effect; automatic drop shadows; Colorfonts are supported.
- Movable and resizable magnification window with built-in gadgets allowing variable sizing of the magnified pixels and scrolling around the magnified image in all four directions.
- Choice between transparent or opaque background color, selectable from the menu bar.
- 64 color palette display, with the ability to alter any color box on the palette without affecting the screen pixels previously painted using the color in that position; thus allowing the use of all 4096 colors in the same painting.
- Ability to create palette color spreads using EITHER Red Green Blue (RGB) OR Hue Saturation Value calculations.
- Ability to specify the 16 base colors in the Amiga's internal color registers; enabling the artist to select the group of colors which will be the basis for all HAM calculations.

ABOUT THIS MANUAL:

I have attempted to make this manual as "user friendly" as I know how. Perhaps it will seem redundant to the truly "Amiga Literate" out there, who have purchased this program after having had extensive experience with this intricate computer, and with other paint programs, but I hail all too recently from the ranks of those artists who were learning to use their very first personal computer, and were confounded by the cryptic and ambiguous explanations given in many manuals.

I do try to take you by the hand and guide you clearly through the steps of each different operation; looking for the best way to describe things so they cannot be misinterpreted. I remember all too well reading my first manual wherein someone told me to, "click inside the 'Watchamacallit' Gadget," and I sat there asking myself, "Click what? With what?," and, "Which button do I use?," or, "Why doesn't that

requester go away?." My most intelligent purchase was a modem...all those kind and helpful souls on the BBS's...but then there was the manual for the telecommunications program...(sigh). It was an experience.

This manual explains each subject on the Main Menu bar in order, from left to right, with a chapter devoted to each different menu. I concentrated on explaining each subject as completely as possible, sometimes having to repeat portions of the explanations pertaining to other functions which interact, so that a user would not have to search through different portions of the manual to put together pieces of the puzzle (another pet peeve from the past!).

The last chapter will consist of as many tutorials as I can write before either: 1. My deadline, or: 2. I run out of ideas!

Happy HAMming,

Heidi Turnipseed

2 Getting Started

SYSTEM REQUIREMENTS

512 K MINIMUM; 1 MEGABYTE RECOMMENDED FOR 320 X 400 MODE; ADDITIONAL MEMORY RECOMMENDED FOR ANIMATION DEVELOPMENT; EXTERNAL DISK DRIVE RECOMMENDED.

PHOTON PAINT will function properly in 320 X 200 resolution (non-interlaced mode) with a minimum of 512 K RAM. The program's architecture is segmented, allowing full functionality in lo-resolution on 512 K machines. A possible exception could be encountered when using the text function in very large font styles of approximately 60 pixels high or more, or when using other combinations of functions and operations which use up large portions of available memory.

1 Megabyte is recommended if you intend to work in the 320 X 400 (interlaced mode) format. 512 K will be adequate for many functions, but some operations, such as the "undo" function, and spare screen, will usually be refused due to memory shortages.

Animation development will require the highest amount of available memory. One megabyte would be the bare minimum, and two megabytes or more will afford you much greater flexibility.

Overlays will be read from the disk occasionally, depending upon the amount of available memory; therefore a second disk drive is recommended. This will enable the user to leave the program disk in the first drive (df0:), and maintain a separate data disk in the second drive (df1:) for saving artwork.

LOADING THE PROGRAM:

Perhaps you are a seasoned user of the Amiga computer. If so, please bear with me as I guide those users who have perhaps purchased PHOTON PAINT as their first applications program with their new Amiga, or you can go on a head and skip to Chapter Three.

Turn on your monitor, then turn on your Amiga's CPU (Central Processing Unit). After you have done so, a few "gronking" sounds will occur, followed by a picture of a hand holding a disk labeled, "Workbench" (Amiga 1000 owners will first see the disk

labeled "Kickstart"; insert this disk and then wait for the prompt to insert Workbench). Instead, insert your PHOTON PAINT disk. The Workbench information is included on your PHOTON PAINT disk, and the program will then load properly.

The Workbench screen will appear, which is blue with a white stripe at the top containing the words "Workbench Screen"; just below, to the right of the screen, you will see a small "icon" representing the PHOTON PAINT disk. Move your Amiga's "mouse" until you've positioned the arrow shaped pointer over this icon, and click the left button on the mouse twice, quickly. The icon will change its appearance, indicating that it has been selected. You will then see a smaller, rectangular "window" appear, surrounded by a white border. It will contain an icon representing the PHOTON PAINT program. Position your mouse pointer over this icon, and click the left button twice, quickly. This icon, too, will change its appearance, and the program will begin to load. More "gronking" noises, then a different screen will scroll in to view for your enjoyment while the program finishes loading; this is our title screen. The final screen will be black with a colorful palette and drawing gadget "Fastmenu" at the top of the screen; now you are ready to paint in 4096 colors!

Certain aspects of the program will be accessed from the program disk in order to enable this complex paint program to operate in 512 K. If you do not have a second disk drive, leave the program disk in the first drive (df0:) until you wish to save a painting to a separate data disk; then switch for the saving process only, replacing the program disk afterward.

PHOTON PAINT will attempt to load all of its functions into main memory during the process of loading the program. If you have one megabyte or more of memory, and do not intend to create more than about ten frames of animation in 320 X 200 resolution, you may find this convenient. The program will function quickly without having to search and load new information from the program disk in the internal disk drive.

If you would like to limit the amount of internal memory taken up by the PHOTON PAINT program, press the ESCape key soon after the PHOTON PAINT title screen has scrolled up and filled the screen. The program will automatically load the minimum functions needed to operate into memory, and stop prior to loading in additional

features. If you press the ESC key before the program can cease loading, it will be ignored until the minimum number of functions are in memory, so keep pressing ESC until the "gronking" sound stops!.

The final tutorial in Chapter Nine deals with loading an ANIM file containing ten frames of animation. You will need to follow the above procedure in order to play the animation if you have no more than one megabyte of memory.

3 The Project Menu

Move your mouse pointer to the top of the screen, as far as it will go; then hold down the right (as opposed to "left") mouse button. A white stripe will appear (the "menu bar"), containing several words: PROJECT, PREFS, BRUSH, SPECIAL, FgMODE and BgMODE. Each of these words designates the subject of a "MENU," which will appear beneath each word as you move the mouse pointer over it while holding down the right button. The word will also be highlighted in a lavender color. This first chapter will describe the functions of each of the items listed on the first menu at the left hand side of the menu bar: the PROJECT menu.

As you continue to press the right button and move your mouse pointer down over each word listed beneath the title, PROJECT, you'll notice that each word is highlighted in lavender, and when certain words are highlighted, an additional sub-menu will appear. Each menu item which contains a sub-menu has a right-pointing arrow to the left of the word. If selecting an item will call up a window in which you can enter data and/or make decisions, you'll see three dots to the right of the word. These menu and sub-menu items are selected by releasing the right mouse button while the pointer is located on top of the word, and it is highlighted. We will discuss each of them in order, top to bottom:

CLEAR: (DELete from the keyboard)

Selecting this item will clear the screen completely. A requester will appear asking you if you really want to clear the screen; you must reply to this requester by positioning your mouse pointer in either the "yes" or "no" gadget and clicking the left mouse button once. Unless you have saved your work to a data disk before hand, the picture on the screen will be lost. The screen will be cleared, and filled with the currently selected background color. The Undo function can be used to retrieve the picture if you've Cleared the screen accidentally, but only if you select Undo before performing any other operation.

The Background Color is selected by positioning the mouse pointer over the desired color square and clicking the right mouse button. The currently selected background color will then be surrounded by a dotted black and white border, and will fill the screen any time "Clear" has been selected from

the Project menu. You can use the "DEL" (delete) key on the keyboard to perform this function if you prefer, without using the mouse. You will see this key represented across from the word, "Clear" on the Project menu.

Another option pertaining to Clearing the screen is selectable from the Prefs Menu, and is listed as "Clear to First." When this item has been selected by highlighting the option and either releasing or clicking the left mouse button while the item is still highlighted, the Clear operation will always clear the screen using the first palette color (top row, far left) as the overall background color, regardless of the currently selected background color you happen to be using. This choice has been included to enable you to preserve your Background Color Mode Setup in the event you wish to Clear the screen to a different color. The Default Palette always appears with the color black in the first palette position, but you can alter this color by selecting it with your left mouse button and then using your color mixing tools on the Color Palette, or you can replace it with any other color in the palette by performing a Copy operation. See Chapter 4, "The Fast Menu and The Color Palette." The default position for this selection is off, that is, Clear will ordinarily Clear the screen to the currently selected Background Color.

LOAD...: (Amiga Key-"L" from the keyboard)

Selecting this item will bring up a window which reads "Load Picture" at the top. Right under this is a black bar labeled "Drawer." A "drawer" is the name of a directory in which paintings ("pictures") have been saved. The name of such a directory must be entered into this black bar prior to attempting to load a picture from the data disk.

The program will automatically search the program disk, which is in df0:, and list its directories, the names of which will all appear in the large, dark grey requester in the center of the window. A separate "Art Disk" has been included with the program package. If you have a second disk drive (df1:) insert the "Art Disk" there, and click the left mouse button while your pointer is located inside the gadget which reads "df1:." If you do not have a second disk drive, remove the program disk from df0: after the "Load Picture" window

has appeared; then select the "df0:" gadget. This will cause the program to read the new disk in df0: and display its directories in the requester. If you would like to load one of these sample pictures, move your mouse pointer over the words "(dir) PICTURES," and click the left mouse button. The directory name "PICTURES" will then appear in the black bar labeled "Drawer," preceded by the name of the disk drive on which it is located.

The titles of all pictures stored in the PICTURES directory will appear in the large, dark grey requester. You can select one of these to load by placing your mouse pointer over its title, and clicking the left button. The black bar labeled "Pattern" allows you to enter a particular file extension and limit the listing in the requester to those filenames with that extension; or you can select the "*.PIC" gadget to make the program list only files with the extension ".Pic." If you want to return to listing all filenames regardless of extensions, select the "*" gadget. Now, if you click the left mouse button inside the gadget which reads "LOAD," the window will disappear, and the selected picture file will begin to fill the screen.

The ESC (escape key) can be used to abort loading.

Some of the picture titles may contain the extension ".lace"; this indicates that the picture was created in the interlace mode, and the program will have to switch screen resolutions in order to load this picture (the program always boots up in non-interlace mode initially). Should you choose to load an interlace picture while the program is still in non-interlace mode, a requester will appear asking you to verify your intention to change screen resolutions. Likewise, if you are already in interlace mode and attempt to load a non-interlace picture, the requester will prompt you to verify your decision before the picture can be loaded

Two gadgets will appear on the bottom of the requester which read "Yes" and "NO"; you must choose one of them by placing your mouse pointer inside and clicking the left button. This is a "Load prompt," and you can choose not to be prompted by de-selecting this option on the Prefs Menu. This will be discussed further in the chapter which describes the Prefs Menu.

Should you change your mind about loading a picture, just select the gadget which reads "CANCEL," and the requester will disappear, returning you to the screen.

If you have an ANIM file which you would like to load you can do so using the proceedure described above. You may want to store ANIM files in their own directory, to make searching for their titles less time consuming. When you select an ANIM file to load, a requester will prompt you with the question, "Load all ANIM pages?" By responding "Yes" or "NO" you can decide to load the entire series, or just the very first frame. If you select the "Yes" gadget the program will open each picture of the series into its own screen one after another until all pictures are loaded in the sequence in which they were saved. If another frame or frames are currently loaded, you will be further prompted with the question, "OK to delete ALL alternate pages???." If you select "Yes," the program will make space for the new pages by deleting the old; if you select "NO," the operation will abort.

This is far more efficient than saving and loading each picture separately; it also saves quite a bit of space on your data disk because ANIM files are stored using a special form of compression which saves only the changes from one frame to another, comparing each frame to its predecessor. The procedure for saving ANIM files is covered below, under "Save Anim." You can call up this requester from the keyboard, without using the mouse, by holding down either "Amiga Key" and pressing the "L" key at the same time. The appearance of the "Amiga Keys" may differ according to the model of Amiga computer you own. On the Amiga 1000 and some Amiga 2000's they are the two big red "A"s on either side of the space bar; the left one is solid red, and the right one is outlined in red. The Amiga 500 and some 2000's have the "Commodore" symbol on the key to the left of the space bar, and the solid capital "A" on the right, and neither of these symbols are red.

Positioning the mouse pointer over the file name when it is listed in the main portion of the requester, and then double-clicking the left mouse button will simultaneously select the item and perform the loading operation.

SAVE: (Amiga Key-"S" from the keyboard)

Releasing the right mouse button while this heading is highlighted will save the picture currently displayed on screen to the file name of the last picture which was loaded from disk into this page. A requester which reads "Overwrite existing file?" will appear, and you must select "Yes" or "NO." If in doubt, choose "NO"; then select "Save As," which will bring up the Save Picture Requester; then check the file name which is in the black bar labeled "File" before saving the picture on screen.

You may select "Save" without using the mouse by holding down either "Amiga Key" and pressing the "S" key.

Positioning the mouse pointer over the file name when it's listed in the main portion of the requester and double-clicking the left mouse button will simultaneously select the item and perform the saving operation.

SAVE AS...: (Amiga Key-"A" from the keyboard)

Releasing the right mouse button while this heading is highlighted will bring up a requester which is laid out exactly like the "Load" requester, except the gadgets at the bottom read "SAVE" and "CANCEL." If you are saving a new picture for the first time, you will need to type the name of the new picture into the black bar labeled, "File" before selecting the "SAVE" gadget. Just begin typing; the letters will automatically appear in the "File" bar. The "DEL" (delete) and "backspace" keys allow you to change your entry in the black bar prior to selecting "SAVE."

You can call up this window from the keyboard by holding down either "Amiga Key" and pressing the "A" key.

SAVE ANIM: (Right Amiga Key-"N" from the keyboard)

This option will allow you to save a series of your animation frames in a special compressed file format, taking a minimum of storage space on your floppy disk or hard drive, and making it convenient to save (and later load) each page in a series without having to perform a separate save or load operation on each one.

Releasing the right mouse button while this heading is highlighted will bring up a window which is laid out much like the "Save Picture" requester. If you are saving a new ANIM file for the first time, you will need to type the name of the new file into the black bar labeled "File" before selecting the "SAVE" gadget. Just begin typing; the letters will automatically appear in the "File" bar. The "DEL" (delete) and "backspace" keys allow you to change your entry.

The following gadgets appear: FROM, where the number of the first screen to be saved is specified; TO, where the number of the last frame is to be specified, and Continuous, which is a gadget to be selected in the event your series of pictures should be played back as a continuing "cycle" (picture number 1 logically follows the last picture and the series repeats over and over again as a "loop").

PHOTON PAINT will load an Anim file by opening the compressed frames and loading each one into its own separate screen, numbering them as they were when originally saved. You may, however, wish to load your Anim file into a specialized animation program, such as PHOTON VIDEO CEL ANIMATOR, for playback without decompressing the frames. In that case an ANIM file which is a loop will have had to be saved by specifying that it is intended to be continuous.

The Continuous Gadget is unselected when the requester first appears, and appears as light grey letters on a black background.When selected by placing the mouse pointer over the Gadget and clicking the left mouse button once, the Gadget becomes white with black lettering.

FROM and TO have associated "String Gadgets" (boxes or bars where you can enter numbers and/or letters). Select the String Gadget next to the word FROM by placing your mouse pointer inside the box and clicking once with the left button; the cursor will then appear inside the box. Type in the number of the first page in the series of pages you want to save as an Anim file. Then select the TO String Gadget, and enter the number of the last page you want to save in your Anim file. The default entries will be FROM number 1 and TO the number of the last page in your presently loaded series.You can change

these in the event you want to save only a portion of the series you have been working on as an Anim file.

You can call up this function from the keyboard by holding down the Right Amiga Key and pressing the "N" key.

DELETE...: (Amiga Key-"D" from the keyboard)

Releasing the right mouse button while this heading is highlighted will bring up a window which is laid out exactly like the "Load Picture" requester, except that the phrase at the top reads "Delete Picture," and the gadgets at the bottom read "DELETE" and "CANCEL."

If you wish to delete a picture, select its title the way you selected a title to either load or save; then place your pointer inside the gadget which reads "DELETE," and click the left mouse button. If you have changed your mind, and no longer wish to delete a picture file, select "CANCEL." After selecting "DELETE," one more little requester appears, giving you a last chance to change your mind; it asks, "Delete this file?," and you must select either "Yes" or "NO."

You can call up this function from the keyboard by holding down either Amiga Key and pressing the "D" key.

PRINT...: (Amiga Key-"P" from the keyboard)

Before selecting "Print" from the Project Menu, you need to return to the Workbench Screen and enter Preferences to select the printer driver for your particular printer; then select the other settings available on the Graphic Select screen.

Please refer to your Amiga User Guides for a complete description of the use of Preferences, and its requesters and gadgets.

To return to the Workbench Screen from the Photon Paint screen, select "➔ Workbench" from the Prefs Menu by moving your pointer to the very top of the screen, holding down the right mouse button, moving down the menu to highlight the word "➔ Workbench"; then releasing the mouse button while highlighting the word "Open" on the sub-menu.

Once you have set your printing parameters in Preferences, you can select "Print" from the Project Menu by moving your pointer to the very top of the screen, holding down your right mouse button, moving your pointer down to the word "Print," and releasing the button while the word is highlighted.

PHOTON PAINT's print requester will now appear, allowing you complete control over the printing parameters, including printer setup, image size, location, color, and number of copies. The following Gadgets are available:

Shade: to decide whether printing will be done in Black and White, shades of grey, or color.

Aspect: to decide if the image will be printed Horizontally, along the entire length of the paper, or Vertically, across only the top half of the paper.

Image: to select between printing a Positive (normal) image or a Negative image (as in a photo negative).

Smooth: to allow the selection of an "anti-aliasing" function to be performed on diagonal lines; intended to smooth out the "jaggies" or little stair steps which are visible. This function CANNOT be used in conjunction with F-S Dithering (below).

Dither: to select among the following three modes of dithering: (1) Ordered, which is the default; (2) Halftone, which produces a result similar to that seen in newspapers and comic books, and (3) F-S, which is the "Floyd-Steinberg" error distribution method; the F-S mode CANNOT be used in conjunction with the Smoothing (anti-aliasing) function (above), so if one has already been selected, it will automatically de-select if the other is subsequently chosen.

Correct RGB: to allow the correction of any or all of the Red, Green and Blue components of your printed picture to better correspond with the colors displayed on your monitor screen. Select the gadget(s) containing the first letter of the color for which you wish the program to correct the printing.

Threshold: to set the level of brightness to be used in Black and White printing. This determines the point at which pixels below the threshold will be printed black, and pixels above the threshold will be printed white.

Size Method: to select among the following three methods for setting the size of the printed page:

(1) "Margins," allows you to specify the number of text sized spaces available for the image by setting the locations of the margins relative to the outside dimensions of the paper, counting from the left. Use the "Left Margin" and "Right Margin" String Gadgets below to enter the location of each margin from the left side of the paper. Your current settings in the Workbench's Preferences will be used as a default, and the number of total spaces available will depend upon whether you have selected 60 or 80 text spaces in your Preferences program. The height of the printed image will be calculated from the margin settings so as to maintain the correct aspect ratio.

(2) "Inches," which alters the two String Gadgets below to read "Width," and "Height," so you can enter maximum settings within which the program can calculate the correct aspect ratio of the printed picture. If you want the program to distort the aspect ratio to fit the exact settings you have entered, select the "Fit to Size" Gadget to the right of the Width and Height Gadgets. If you have a current setting in Preferences, this will be taken as a default.

(3) "Percentage," allows you to specify the size of a printed image in terms of a percentage of the dimensions you have already set in Preferences. Maximum values are 100% for both Width and Height. The maximum (100%) Height of the image is determined by the number of lines per page/number of lines per inch specified in Preferences, and the maximum (100%) Width will be determined by the left and right margin settings selected in Preferences. The image will be scaled to fit within the parameters you've set here and in Preferences, and therefore the original aspect ratio will be altered, unless one dimension is set to 0 (zero).

Number of Copies: maximum is 999.

Center: selection of this Gadget insures that the printed image will be centered on the page.

The last two Gadgets on the requester are "PRINT" and "CANCEL," affording you the choice to continue with the printing process, or return to the drawing screen. After you select "PRINT," another small requester will pop up, displaying the number of the copy you are presently printing, and the total number of copies remaining to be printed. An "Abort" Gadget is also present,

affording you the continued option of halting the printing process, or you can simply press the Escape Key (ESC).

FAST MENU: (HELP key or F10 from the keyboard)

Selection of this option will cause the Fast Menu to reappear on the screen after you have previously made it disappear. The Fast Menu is the display which appears at the top of your screen after PHOTON PAINT first boots up, and it contains your Color Palette and drawing tools. The Fast Menu is discussed in detail in Chapter Four: The Fast Menu and the Color Palette

You can invoke this function from the keyboard by pressing the "HELP" key or the F10 function key (the Function Keys are the row of darker keys at the top of your keyboard, and are numbered from F1 to F10). These two keyboard equivalents act as toggles, and will cause the Fast Menu to reappear and disappear alternately each time they are pressed.

➔ BASE COLORS:

The next selection you'll find on the "Project Menu," beneath the choice "Fast Menu" will be "➔ Base Colors." As indicated by the left-pointing arrow, this topic has a sub-menu.

In HAM (Hold And Modify) mode, the Amiga uses 16 color registers to hold 16 "base colors" which the display circuits of the Amiga can modify to produce the other colors in the picture.

A base color can happen to reside in any of the color boxes in the palette. The easiest way to make certain you are drawing with a base color is to select the "Current" option in the "Base Colors" sub-menu, causing the current base colors to be displayed in the upper palette row; then draw with those colors. The base colors can be copied to squares in the other palette rows, or a box in another row can be modified to match one of the base colors.

When you draw with a base color, PHOTON PAINT does not have to modify any preceding pixels in order to display that color; this usually results in cleaner drawings.

You can select and/or mix a different set of base colors with which to paint, and display them in the upper palette row:

1. Call up the current base colors using the "Current" option in the "Base Colors" sub-menu.

2. Change the color boxes in the upper palette row to the desired colors (see Chapter Four: The Color Palette).

3. Select "Affect Picture" from the "Base Colors" sub-menu, which will set the base colors to the new ones you've selected in the upper palette row. When you Save your painting the custom palette you've designed will become part of its picture file.

The Amiga has 16 color registers available from which to reference the colors it modifies to produce all 4096 Hold And Modify colors. Sometimes, a three pixel transition is required before a desired color can be placed onscreen. These transitions, or "artifacts," or "fringes" were not intended by the artist to be part of the picture. To some degree, this is unavoidable in HAM mode. Our goal in producing Photon Paint was to process the user's renderings in such a way as to correct the display and minimize these artifacts.

To achieve the above objective, Photon Paint uses the base colors to improve the corrections of the HAM artifacts. Proper selection of the base colors not only determines your purest painting repertoire, but also which colors the program will have available to achieve optimal corrections of these artifacts, or color transitions.

If you intend to use a wide variety of colors in your painting, we suggest you do not change the current base colors from their default settings to those you wish to paint with, but leave them to be utilized for their internal function only; i.e., correcting the HAM display of your paintings.

When the program is first loaded (without having loaded a specific picture), the base colors are set to the default setting. This setting will produce the most reasonable results in most cases.

When a stored picture is loaded, the base colors are set from those stored with the picture. Every picture file contains a section in which the base colors used to create that picture are saved.

Unless the corrections done by the program are considered inadequate, you should not have to change the setting of the base colors to optimize the correction process.

The following are some specific guidelines for changing the base colors to best correct or minimize HAM fringing when you are painting with the other non-base, or transitional colors:

1. If you know you will be using a limited number of colors, try sorting them into color families, i.e. blues, reds, greens, etc., and then select a representative color for each of the families to be used as a base color.

2. Avoid choosing base colors which are too similar. It will be more useful to allocate all 16 positions to different representatives of your various color families.

3. Do not drastically change the base colors of a digitized picture.The digitizer will most likely have allocated the most appropriate colors to the color registers.

4. Do not drastically change the base colors of a picture file imported from another color paint program. PHOTON PAINT does its best to determine the most appropriate base colors in that case.

5. If a specific rendering produces noticeable artifacts, first "undo" it; then try:

a. changing one of the base colors to the color with which the rendering was done, and,

b. changing another base color to the color of the background area on which the rendering was done (assuming that the background was a solid color; if not, choose the most predominant color of the background area).

6. De-select the "Exact Color" option in the Prefs Menu (there should be no "X" in the little circle to the left of the item) whenever it will be acceptable to allow the program to use the closest approximate color to the one chosen from the palette. This will usually produce cleaner drawings by minimizing transitional adjustments.

The following options are located on the Base Colors sub-Menu:

I. FROM BRUSH:

The first selection in the "➔ Base Colors" sub-menu will copy the base colors from the current brush (cut from the picture) to the registers.

This is useful when loading a brush which was created with a different set of base colors; or which has been imported from the alternate screen with a different set of base colors.

II. FROM NEXT PAGE:

This selection copies the base colors used in the next screen (if you have established one).

This is useful when you intend to cut a brush from one page and move it to the other; eliminating the need to remap either the picture on the subsequent page, or the brush after moving it there.

If you are planning a series of animation pages, my suggestion is to utilize the same palette for all pages in the series, and for the intended background painting as well. This will avoid the necessity of copying base colors later to minimize HAM fringing. If you want a specific customized palette, create it on the first frame you paint, whether it happens to be the animation or the background, and then select Affect Picture (below). This palette will then be automatically assigned to all pages you append to the series (see Alternate/Append Page, below).

III. RESTORE:

The third selection will restore to the first palette line the original 16 base colors selected by the program when the current picture was first loaded.

IV. DEFAULT:

The fourth selection will restore to the first palette line the 16 base colors always selected by the program initially; prior to any picture being loaded.

V. CURRENT:

Select this option to display the current base colors being used by the program; locating them in the first palette row.

VI. AFFECT PICTURE:

Select this option after you have modified the colors in the first palette row, and wish to have the program use them as the base colors for the current picture.

This will not only affect the pixels which were drawn with the new base colors, but will also affect any dependent pixels, and some of Photon Paint's corrections of the HAM display protocol.

Also select this option after you have designed a set of base colors to be used in a new painting; storing them in the registers before you begin.

VII. REMAP PICTURE:

This selection will remap the currently displayed picture using the 16 colors located in the first palette row as the new base colors. The program will try to preserve the original appearance of the picture while doing so.

VIII. RESTORE PALETTE:

This selection will restore the original palette of a loaded picture; that is, the one with which it was created and saved; or it will restore the default palette, if no picture has been loaded.

IX. DEFAULT PALETTE:

This last selection will enable you to restore the program's original default palette. This is the palette which PHOTON PAINT always boots up with prior to the loading of any picture file(s).

➔ ALTERNATE:

The next option on the Project Menu enables you to use an additional page or pages. New pages can be created up to the limit of available memory. Using an Amiga with 2 megabytes, you can enjoy approximately 30 additional pages in lo-res 320 X 200 mode. The Title Bar of the Fast Menu will display the page number of the screen you are currently working on, followed by the total number of pages in your series; i.e. 1/5, 2/5, 3/5, etc.

There is a sub-menu, as indicated by the left-pointing arrow, containing the following options:

I. NEXT PAGE: ("K" from the keyboard)

Choosing this option will switch you from the screen you are currently using to the next screen. You may have created a series of screens by appending a page or pages (see Append Page, below). If additional pages are not yet appended, selecting this item will create a second, or alternate page, which will then be switched back and forth with the first page when this item is selected. Each page will function just like the first page, and brushes can be picked up and copied from one page to the other.

II. PREVIOUS PAGE: ("J" from the keyboard)

Choosing this option will switch you from the page you are currently using to the previous page. You may have created a series of pages by appending one or more (see APPEND PAGE, below). If additional pages have not yet been appended, selecting this item will create an alternate page ahead of your current one, which can then be switched back and forth with the original (now page 2 of 2: 2/2). Each page will function just like the first, and brushes can be picked up and copied from one page to another.

III. GO TO PAGE...: ("L" from the keyboard)

Selecting this item will bring up a requester in which you can use the little String Gadget to enter the series number of the page you wish to work on next. Select "OK" to proceed, or "Cancel" to abort.

IV. INSERT PAGE: (Shift-"J" from the keyboard)

This selection will insert an additional page between the page you are currently working on and any previous pages. For example, if you are working on page number 3 out of a series of 6 (3/6) and select "Insert Page," you will be moved to the blank page you have inserted (3/7), and the page you were on before will have become 4/7.

V. APPEND PAGE: (Amiga Key-"J" from the keyboard)

This selection will insert an additional page between the page you are currently working on and any following pages. For example, if you are working on page number 3 out of a series of 7 (3/7) and select "Append Page," you will be moved to the blank page you have appended (4/8), and the page

you were on before will have become 3/8. If you are already at the last page in a series this selection will add another page to that series.

VI. EXCHANGE PAGES:

This selection allows you to exchange the page you are currently working on with any other page in your series. A small requester will pop up, containing a small black box (String Gadget) in which you can enter the number of the page you want to exchange. Just type the number of the page you want to exchange with your current one; the number will appear inside the String Gadget. If you need to change your entry you can use the Backspace Key to erase before you enter another number. Select the "OK" Gadget when you are ready to proceed, or "CANCEL" to abort.

VII. DELETE PAGE: (Amiga Key-"K" from the keyboard)

Selecting this option will instruct the program to delete the screen (page) which is currently displayed. A requester will appear which reads, "Delete this page?," and you must select either "Yes" or "NO" before continuing. Be very certain of your decision when you use this function, because you cannot "UNDO" it once you've selected "Yes"

VIII. DELETE ALL PAGES:

Selecting this option will instruct the program to delete all alternate pages which are not being displayed at the moment. A requester will appear which reads "Okay to delete ALL alt pages???," and you must select either "Yes" or "NO" before continuing. The current page is the only one retained, and it becomes number 1 of 1 (1/1). Be very certain of your decision when you use this function, because you cannot "UNDO" it once you've selected "Yes."

XI. COPY TO NEXT: (Amiga Key-"C" from the keyboard)

Selecting this option will copy the contents of the current page to the next page, and move you to the next page. If the current page is the only page existing, or if it is the last in a series of pages, this command will add an additional page and copy the current page there. If you've already created a subsequent page or pages, a requester will appear which reads "Copy this page to next?," and you must select either "Yes" or "NO" before continuing.

This prompt helps to prevent you from accidentally copying over and losing material that you have already created.

X. MERGE TO NEXT:

This operation merges the contents of the current page on top of the artwork on the next page, treating the selected background color of the current page as transparent. If you have selected "Clear to First" from the Prefs Menu, the first palette color (top row of colors, first from the left) will be treated as transparent, regardless of the chosen background color.

This option is especially useful when preparing animation in which you need to combine a series of changing foreground subjects with a constant back-ground.

XI. ANIMATE: ("A" to begin; ESC to halt, from the keyboard)

Selection of this option will bring up a small requester which allows you to specify the following parameters:

(1) From: enter the number of the first page in your animation sequence. The number "1" appears by default. If you want to begin with another page number, use the DELete Key to erase the number "1" and then type in the number you choose. The cursor automatically appears in this String Gadget when the requester first appears, so it is not necessary to select this gadget before changing the entry.

(2) To: enter the number of the last page in your animation sequence. The number of the last page you currently have in memory will automatically be displayed. If you want to end with another page number while playing the animation, it is necessary to select this gadget before changing the entry. Place your mouse pointer inside the String Gadget and over the first digit appearing inside it; then click the left mouse button. Now use the DELete Key to erase the existing number and then type in the number you choose.

(3) Delay: specify the delay period between the display of each successive frame in approximately 1/60ths of a second on a standard Amiga. The maximum frame rate attainable is approximately 12 frames per second, which would equal a delay of 5/60ths of a second. If you leave this gadget

untouched (still reading "0") the fastest playback rate possible will automatically be utilized.

It is necessary to select this gadget if you want to change the entry. Follow the instructions immediately above, under "(2) To:" for entering a new number in the String Gadget.

(4) Reverse: when this Gadget has been selected, the series of frames will be played from beginning to end as usual, and then back from the end to the beginning; ad infinitum (back and forth, back and forth...). The default position for this gadget is unselected (black background, light grey letters). Select it by placing your mouse pointer inside it and clicking the left button once; it will then appear highlighted (white background, dark grey letters). Select the "OK" Gadget to begin the animation process, or "CANCEL" to abort. To halt the animation playback process, press the Escape Key (ESC).

➔ FONT:

When this selection is highlighted in lavender the Fonts sub-menu will appear, containing the following options:

I. LOAD: (Amiga Key-"T" from the keyboard)

Selection of this option will bring up a requester entitled, "Select Font," which is specifically designed to look for the Font directory on whatever device (df0:, df1:, dh0:, etc.) you select, then list the contents. The font files are listed by name, followed by their point size, i.e. Topaz.8, Diamond.20, etc. The program boots up with the first standard Amiga font (Topaz 8) selected.

"Colorfonts" are now supported. These are fonts which have been designed with built in colors and patterns, and their files contain a colormap which specifies the particular arrangement of colors needed to display the design. Color numbers in the Colorfont colormap are correlated with similarly numbered color boxes in PHOTON PAINT's Color Palette, e.g. color "4" in the colormap will correspond with the fourth color palette square, beginning with the first color on the upper left, top row. You can rearrange the color squares on the palette so that the Colorfonts are drawn with the colors of your choice;

however you'll have to experiment to determine which colors correspond with which numbers, but that should be interesting, after all! The Colorfont filenames are indicated in italics.

Select a font by clicking your left mouse button while your pointer is over its filename; the filename will appear in the black bar (a "String Gadget": designated area in a requester in which you can enter data) labeled, "Font.Size." Select "LOAD" to proceed, or "CANCEL" to abort the process.

To use a selected font onscreen, you need to select the "Text Tool" from the fast menu. Place the mouse pointer inside the little light grey square in the bottom row of tool gadgets which has an "A" in it; then click the left mouse button. A hollow rectangle will appear when you return your pointer to the screen; this represents the size of your chosen font. Position this rectangle where you want to begin typing, and click the left mouse button to anchor it in place. Whenever you want to begin typing in a different area of the screen, move your mouse pointer to the desired location and click the left mouse button to reposition the rectangle; then click it one more time to reactivate the text tool (or the program may interpret your keyboard entries as commands which invoke other functions).

Several of the familiar features of word-processing are incorporated in the text tool; with the added convenience of positioning your first letter anywhere on the screen. The arrow keys, space bar, and backspace keys all function within the path you established when you placed your first letter.

II. ITALIC:

Selection of this option will cause your chosen font to appear in italics. When Italic has been selected, an "X" will appear within the small circle to the left of the word. This option is supported for Colorfonts.

III. BOLD:

Selection of this option will cause your chosen font to appear in BOLDFACE. When Bold has been selected, an "X" will appear within the small circle to the left of the word. This option is not supported for Colorfonts.

IV. UNDERLINE:

Selection of this option will cause your chosen font to appear underlined. When Underline has been selected, an "X" will appear within the small circle to the left of the word. This option will work with Colorfonts, but will be a single line width; not the actual Colorfont design.

V. OUTLINE:

Selection of this option will cause your chosen font to appear outlined. When Outline has been selected, an "X" will appear within the small circle to the left of the word. This option is not supported for Colorfonts.

VI. REVERSE:

Selection of this option will cause the letters of your chosen font to appear in reverse order (from right to left). The letters themselves will not be printed in reverse. When Reverse has been selected, an "X" will appear within the small circle to the left of the word.

Select one or more of these options by continuing to hold down the right mouse button, and, as you move down the list, clicking the left mouse button while each of your choices is highlighted. You'll notice that the little circle to the left of each selection is filled with an "X" after you've performed the above procedure. These choices will remain in effect until you de-select them using the same method.

To select one of the other fonts on the list, follow the usual procedure; then select another choice from the font loading requester. When you return to the screen, a different sized rectangle will appear in the same position.

VII. FREE: (Amiga Key-DELete Key from the keyboard)

This option will clear the currently loaded font from memory to make room for other functions; it "frees" the memory which had been taken up by the current font.

NOTE: When using the same font design and point size in 320 x 400 resolution as you saw in 320 x 200, you'll see that the higher resolution mode will reduce the vertical proportions of the letters by half. If you prefer the proportions you

saw in the lower resolution just capture your text as a brush; go into the "Brush" menu and select "Resize"; then on the sub-menu choose "Double Vert," and your letters will be returned to their former shapes.

VIDEO: (Amiga Key-"V" from the keyboard)

This option has been provided to facilitate video recording and/or photo applications.

Selection of this feature will remove the mouse pointer, the Fast Menu (if it's currently on screen), and the Main Menu Bar from view so that a clean image remains on the screen.

Pressing the "I" key while in Video Mode will interlace the screen display if the screen format is lo-res and, therefore, not already interlaced. You will want an interlaced display if you are recording your animation onto video tape.

The program will be frozen after this item is selected. To return to normal operation, press Amiga Key-"V" again.

ABOUT...:

Selection of this menu option will bring up a window containing information about the origin of the program and a list of its developers. Select "More" to finish reading the information; then "OK" to return to the program.

QUIT: (Amiga Key-"Q" from the keyboard)

This selection will quit the program and return you to the Workbench Screen. A requester will appear asking, "Are you sure you want to quit?"; choose "Yes" to quit the program, or "NO" in order to continue.

4 The Fast Menu & The Color Palette

The Fast Menu contains the Color Palette, and they are both elements of the first display you will see after the program "boots up" (is fully loaded in the Amiga's memory, and the drawing screen is displayed). Initially, only the upper half of the Fast Menu is visible, containing four horizontal rows of colored squares on the left, which make up your "Palette"; the Foreground/Background Color Display Square with its alphanumeric readout, and the "Toolbox" on the right, containing grey squares with symbols which represent your selection of drawing tools.

The first section of this chapter will be devoted to the Fast Menu, and the second section to the Color Palette and the selection and mixing of colors.

THE FAST MENU:

The Fast Menu always appears automatically at the top of the screen when the program is first loaded, but can be made to disappear by:

1. moving the mouse pointer to the upper left corner of the menu, and clicking in the small square there (the "Close Gadget");

2. moving the pointer all the way to the upper right corner and clicking the right mouse button;

3. pressing "Help" or "F10" on the keyboard.

The Fast Menu can be made to reappear by:

1. selecting "Fast Menu" from the Project Menu;

2. moving the pointer all the way to the upper right corner, and clicking the right mouse button.

3. pressing "Help" or "F10" on the keyboard;

The Fast Menu can be repositioned vertically on the screen by placing the mouse pointer inside the light grey bar at the top, holding down the left mouse button, and dragging the Fast Menu to the location of your choice. A hollow rectangle will appear, having the same dimensions as the Fast Menu, and when this rectangle is in the desired spot, just release the left mouse button and the Fast Menu will reappear in it's place.

Notice that the word "SCREEN" appears in the left side of the grey bar at the top of the Fast Menu. Placing your pointer inside this word and holding down the left button will enable you to pull the entire PHOTON PAINT screen down, revealing the underlying Workbench screen.

If you have closed the Workbench from the Prefs Menu by selecting "➔ Workbench" and then "Close" from the sub-menu, a blank screen will appear behind the PHOTON PAINT Screen when you pull it down as described above. If you want to make the Workbench Screen available again, go back to the Prefs Menu and select "➔ Workbench"; "Open." Also, PHOTON PAINT will automatically close Workbench when it needs memory for other operations.

TOOLS AND GADGETS ON THE FAST MENU:

I. THE BRUSH GADGET:

On the right side of the Fast Menu you will see a group of grey squares containing symbols; this is your "Toolbox." On the left side of the Toolbox you'll see a larger, grey, vertical rectangle containing two vertical rows of four shapes each.

These shapes represent the exact size and shape of each standard brush with which you can choose to paint. To select one of these standard brushes, place the very tip of the mouse pointer right over the little shape, and click either button. To indicate the chosen brush, a little dark rectangle will then surround it, and the brush shape will become light grey. To select a color from the palette to paint using your chosen brush shape, position your mouse pointer over one of the colored squares in the palette and click the left button; now move the pointer onto the screen, and holding down the left mouse button, paint a line! If you want to remove the experimental squiggle you just created, click on the little square at the top right which reads, "UNDO."

NOTE: BACKGROUND AND FOREGROUND COLORS:

The palette square containing the currently selected Foreground Color will be surrounded by a white border, and this same color will appear inside the left half of the Foreground/Background Color Display Square. The palette square

containing the currently selected Background Color will be surrounded by a dotted black and white outline, and this color will appear in the right half of the Display Square. The Foreground/Background Color Display Square is located in between the palette squares and the Toolbox, and the alphanumeric readout appears underneath it. This readout indicates the Red, Green and Blue (RGB) values of the currently selected Foreground Color.

The Foreground Color can be selected by:

1. positioning the mouse pointer over a small palette square containing the desired color, and clicking the left mouse button;

2. Positioning the mouse pointer inside either half of the Foreground/Background Color Display Square, and clicking the left mouse button.

When you return the mouse pointer to the painting screen, the word "PICK" will extend beneath the crosshairs. Center the crosshairs over a pixel of the color you wish to select as the current Foreground Color, and click the left mouse button; the chosen color will now appear in the left half of the Foreground/Background Color Display Square, and also in the palette square formerly selected as the Foreground Color.

You can facilitate picking a pixel of your intended Foreground Color by using the magnification tool to display the area in which it is located. It's a lot easier to center your crosshairs over a magnified pixel!

Selection of the Background Color is accomplished by:

1. positioning the mouse pointer over a small palette square containing the desired color, and clicking the right mouse button.

2. following the same "Pick" procedure utilized in selecting the Foreground Color, and then re-selecting the same palette square with your right mouse button in order to designate it as the Background Color. The dotted black and white outline will then surround this palette square, and the same color will now appear in the right half of the Foreground/Background Color Display Square.

Notice that your currently selected Foreground and Background Colors are shown in the left and right sides, respectively, of the Foreground/Background Color Display Square.

Likewise, when you wish to paint with the Foreground Color, hold down the left mouse button, and when you wish to paint with the Background Color, hold down the right mouse button.

You can select the palette square to the immediate right of your currently selected Foreground Color as your new Foreground Color by pressing the "]" key; press the "[" key to select the palette square to its immediate left. Likewise, you can use the "}" (with the shift key) to change your current Background Color selection to the palette square on its immediate right, or use the "{" to select the color to the immediate left as your new Background Color.

All operations described below can be performed with either the Foreground Color or the Background Color as just explained. To avoid a certain amount of redundancy, I have explained each tool using the procedure for painting with the Foreground Color. Simply substitute the right mouse button when wishing to paint with the Background Color.

II. THE FREE DRAW TOOL: ("D" from the keyboard)
THE FREE SHAPE FILL TOOL: ("D" twice)

Just to the right of the Brush Gadget are two horizontal rows of little squares which contain a series of symbols. The Free Draw Tool is a little square with a freehand squiggle in it, and is the first square in the top row, just to the right of the Brush Gadget.

When the program first loads, and the Fast Menu initially appears, the Free Draw Tool will be automatically selected, as evidenced by the freehand squiggle appearing in light grey over a dark background. When you use the mouse to paint and draw with your selected brush and Foreground Color, the Free Draw Tool will reproduce the line you create as you move the mouse.

Your freehand-drawn line will be the width of your currently selected standard brush.

The Free Shape Fill Tool allows you to define and fill any freehand drawn shape you enclose with an outline. Click a second time on the Free Draw Tool with your left mouse button; a capital "F" will appear in place of the original squiggly line symbol to indicate that Free Shape Fill has been selected. Position your crosshairs wherever you intend to begin defining your outlined shape and hold down either mouse button while drawing your outline; the mouse button used for outlining your shape determines whether or not you will be filling with the currently selected Background Color Setup or with the Foreground Color Setup. "Setup" refers to the combination of settings you can determine using the FgMode and/or BgMode Menus. The default Setup is "Normal," in which just the ordinary Foreground Color or Background Color is used when the appropriate mouse button is pressed.

As soon as you release the mouse button your shape will be filled with the appropriate color; if you have not connected the beginning of the outline with the end of the outline precisely, a straight line will be assumed between the two in order to finish filling the shape.

You have a choice between drawing a continuous outline around the area you want to Free Shape Fill, thereby completing the operation when you release the mouse button, or being able to edit and correct the outline before the shape is filled in. In order to be able to edit the outline, hold down the Control Key ("CTRL") while drawing your outline; releasing the mouse button will not complete the operation. You can then return to areas of the outline which you would like to correct, and redraw them. Be sure to append the corrected section(s) to the pre-existing outline by starting and ending them on pixels already present in the original outline; that way the program "knows" which segment is to be replaced by the new one. When you have completed the outline to your satisfaction, press the Space Bar to fill your freehand shape.

III. THE DOTTED FREE DRAW TOOL: ("S" from the keyboard)
THE AIRBRUSH TOOL: ("S" twice)

Just below the Free Draw Tool is the Dotted Free Draw Tool, represented by a freehand curve composed of a series of one-pixel dots. With this tool selected, you will create a dotted line in the exact freehand path you draw with the mouse.

The size of the dots will be that of your currently selected standard brush.

Changing the speed at which you move the mouse will affect the spacing of the dots. You can alter the basic speed at which the mouse is handled by the program by selecting "➔ Mouse Speed" in the Prefs Menu, and choosing "Fast," "Medium" or "Slow" from the sub-menu which appears.

The Airbrush tool can be activated by clicking a second time on the Dotted Free Draw tool with your left mouse button; the symbol of a little airbrush will appear. This tool creates an airbrush "spray" effect by generating random brush-sized spots within the confines of a specified circular area. The size of this circular area can be re-defined by clicking your right mouse button while your pointer is inside the Airbrush tool gadget; your crosshairs will then reappear with the abbreviation "AIRB" extending beneath them. Hold down either mouse button and drag the pointer; the circle you are creating represents the size of the new "spray" area you are defining for your Airbrush tool. When you are satisfied with the size of this new area, release the mouse button. The next time you use the Airbrush tool your new circular spray area will be in effect.

IV. THE LINES TOOL: ("V" from the keyboard)
THE FILLED POLYGON TOOL: ("V" twice)

The second symbol in the top row represents the Lines Tool. Its symbol is a straight, diagonal line. This tool enables you to draw a straight line between any two points on the screen.

First, locate the crosshairs of the mouse pointer in whatever spot you wish to begin drawing your straight line; then, continuing to hold down the left mouse button, move the pointer to whatever location you wish to be the end of the line. Notice that you can experiment; move the mouse pointer all over the screen, and a straight line between your point of origin and your current position will be maintained.

As soon as you release the left mouse button, the straight line will freeze into place. Should you wish to cancel the temporary line prior to rendering it onscreen, click the right mouse button without releasing the left. Conversely, if

you are using the right mouse button to draw your line with the Background Color, click the left button without releasing the right one to cancel the line.

Remember, if you are dissatisfied with the position of the line after it has been fixed into place, you can remove it from the screen by clicking on the "UNDO" gadget before performing any other operation, and try again!

The Filled Polygon Tool allows you to define and fill any shape composed of a series of straight lines. Click a second time on the Lines Tool with your left mouse button; a capital "F" will appear in place of the straight line symbol to indicate that Filled Polygon has been selected. Position your crosshairs wherever you want to begin defining your polygon and click either one of the mouse buttons; a straight line will be maintained between this point of origin and your crosshairs as you move to the location of your next point. Click either mouse button to set each successive point. It makes no difference which mouse button you use UNTIL you set your LAST point; the button used for that one determines whether or not you will be filling the polygon with the currently selected Background or Foreground Color. The selected color(s) can also be changed any time prior to the placing of that final point in the polygon. When your polygon is complete you can activate the fill by pressing the Space Bar, or abort the operation by pressing the ESCape key.

V. THE ARC TOOL: ("Q" from the keyboard)

Just below the Lines Tool is the small square representing the Arc Tool; when drawing with this tool selected, it is possible to position and create a mathematically computed arc of varying degrees between any two points.

First, as with the Lines Tool, place the crosshairs of the mouse pointer in your starting position, then, while holding down either mouse button, find your ending position; then release the mouse button. This will result in a straight line between the two points, just like the Lines Tool...but you aren't through yet!

Move the mouse pointer around the straight line, and watch the curve change as if it was being pulled by a magnet. Now, when you are happy with a particular arc, just click either mouse button to freeze it in place; the left mouse button for the Foreground Color Setup, or the right mouse button for the Background Color Setup.

Just as with the Lines Tool, a click with whichever button you are not holding down in order to draw the line, will cancel the line prior to placing it onscreen.

Again, if not pleased with the result, the "UNDO" gadget is your immediate and final recourse.

VI. THE HOLLOW RECTANGLE TOOL: ("R" from keyboard)
THE FILLED RECTANGLE TOOL: (Shift-"R")

Just to the right of the Lines Tool, in the top row of small squares is the Hollow/Filled Rectangle Tool; symbolized by a diagonally divided square which is hollow on top and solid below.

In order to select either the hollow or the filled version, position the mouse pointer with the very tip located in whichever half of the square represents your choice, and click either mouse button.

If you have selected the Hollow Rectangle Tool, the gadget will display a light grey hollow square on a dark background; when you move the mouse pointer onto the drawing area, the crosshairs will have become a set of intersecting lines. The point at which these lines intersect will become one corner of the rectangle.Place the intersection of the lines wherever you would like to locate one corner of your rectangle; then hold down the left mouse button and pull the pointer away in whichever direction you wish. An outline of a rectangle will form, and you can alter it's dimensions in any direction until you release the left mouse button, and freeze the image.

If you have selected the Filled Rectangle Tool, the entire operation is the same, except that the gadget will display a solid light grey square on a dark background, and a filled rectangle will result when you've completed the procedure.

Holding down the left mouse button will utilize the Foreground Color Setup, and the right mouse button will utilize the Background Color Setup.

Just as with the Lines Tool, a click with whichever button you are not holding down in order to draw the shape, will cancel the operation.

VII. THE HOLLOW ELLIPSE TOOL: ("E" from keyboard)
THE FILLED ELLIPSE TOOL: (Shift-"E")

The Hollow/Filled Ellipse Tool is located just beneath the Hollow/Filled Rectangle Tool; symbolized by a diagonally divided oval which is a hollow outline above, and a solid shape below.

The procedures for selecting either the hollow or the filled versions are precisely the same as those for the Hollow/Filled Rectangle Tool; the drawing method differs in that the crosshairs will be located in the eventual center of the ellipse you create. When you hold down the mouse button and drag the crosshairs outward, the ellipse will appear and enlarge. The drawing process will commence when you release the mouse button.

Use the left mouse button for the Foreground Color Setup, or the right mouse button for the Background Color Setup.

Just as with the Lines Tool, a click with whichever button you are not holding down in order to draw the shape, will cancel the operation.

VIII. THE HOLLOW CIRCLE TOOL: ("C" from the keyboard)
THE FILLED CIRCLE TOOL: (Shift-"C")

The Hollow/Filled Circle Tool is located just to the right of the Hollow/Filled Rectangle Tool; symbolized by the diagonally divided circle; hollow above; solid below.

The methods of selection and drawing are identical with those pertaining to the Hollow/Filled Ellipse Tool.

IX. THE TEXT TOOL: ("T" from the keyboard)

In the middle of the bottom row of tool gadgets is a square containing a capital "A"; this represents the Text Tool. Select it by positioning the mouse pointer inside the square and clicking the left mouse button; the letter will reappear in light grey on a dark background, and when you move the mouse back into the drawing area, there will be a small rectangle attached to the crosshairs. This rectangle represents the approximate dimensions of the letters within the set of fonts you will be using.

The program boots up with the first standard Amiga font (Topaz 8) selected. When you wish to select from the entire available list, move your mouse pointer to the Main Menu bar at the top of the screen, and hold down the right mouse button to expose the Main Menu titles; move the pointer over to the title, "Project"; it will be highlighted in lavender. Then, still holding down the right mouse button, move down to the eleventh item on the list, "➔ Fonts"; highlighting it in lavender. A sub-menu will appear, containing the following items:

1. LOAD: (Amiga Key-"T" from the keyboard)

This item can also be selected by positioning your mouse pointer over the Text Tool gadget and clicking the right mouse button.

Selection of this option will bring up a requester entitled, "Select Font," which is specifically designed to look for the Font directory on whatever device (df0:, df1:, dh0:, etc.) you select, then list the contents. The font files are listed by name, followed by their point size, i.e. Topaz.8. The program boots up with the first standard Amiga font (Topaz 8) selected.

"Colorfonts" are now supported. These are fonts which have been designed with built in colors and patterns, and their files contain a colormap which specifies the particular arrangement of colors needed to display the design. Color numbers in the Colorfont colormap are correlated with similarly numbered color boxes in Photon Paint's Color Palette, e.g. color "4" in the colormap will correspond with the fourth color palette square, beginning with the first color on the upper left, top row.You can rearrange the color squares on the palette so that the Colorfonts are drawn with the colors of your choice; however you'll have to experiment to determine which colors correspond with which numbers, but that should be interesting, after all! The Colorfont filenames are indicated in italics.

Select a font by clicking your left mouse button while your pointer is over it's filename; the file-name will appear in the String Gadget labeled, "Font.Size." Select "LOAD" to proceed, or "CANCEL" to abort the process. You can also select and load a font quickly by double clicking your left mouse button while the mouse pointer is located over the filename.

To use a selected font onscreen, you need to select the Text Tool from the fast menu. Place the mouse pointer inside the little light grey square in the bottom row of tool gadgets which has an "A" in it; then click the left mouse button. A hollow rectangle will appear when you return your pointer to the screen; this represents the approximate size of your chosen font. Position this rectangle where you want to begin typing, and click either mouse button to anchor it. If you attempt to type before anchoring the rectangle, the program will interpret certain letters to be keyboard commands, and no letters will appear on the screen. If you want to reposition the rectangle, click either mouse button again to release it; then click the mouse button again to set it into its new position before typing.

Several of the familiar features of word-processing are incorporated in the text tool; with the added convenience of positioning your first letter anywhere on the screen. The arrow keys, space bar, and back-space keys all function within the path you established when you placed your first letter.

2. ITALIC:

Selection of this option will cause your chosen font to appear in italics. When Italic has been selected, an "X" will appear within the small circle to the left of the word. This option is supported for Colorfonts.

3. BOLD:

Selection of this option will cause your chosen font to appear in Boldface. When Bold has been selected, an "X" will appear within the small circle to the left of the word. This option is not supported for Colorfonts.

4. UNDERLINE:

Selection of this option will cause your chosen font to appear Underlined. When Underline has been selected, an "X" will appear within the small circle to the left of the word. This option is supported for Colorfonts, although the underline will not be composed of the Colorfont design.

5. OUTLINE:

Selection of this option will cause your chosen font to appear Outlined. When Outline has been selected, an "X" will appear within the small circle to the left of the word. This option is not supported for Colorfonts.

6. REVERSE:

Selection of this option will cause your chosen font to appear in Reverse; the individual letters will appear on the screen from right to left. The shapes of the letters themselves will not have been reversed. When Reverse has been selected, an "X" will appear within the small circle to the left of the word.

Select one or more of these options by continuing to hold down the right mouse button, and, as you move down the list, clicking the left mouse button while each of your choices is highlighted. You'll notice that the little circle to the left of each selection is filled with an "X" after you've performed the above procedure. These choices will remain in effect until you de-select them using the same method.

To select one of the other fonts on the list, follow the usual procedure; then select another choice from the font loading requester. When you return to the screen, reselect the Font tool from the Fast Menu Toolbox, and a different sized rectangle will appear, attached to the crosshairs.

NOTE: When using the same font design and point size in 320 x 400 resolution as you saw in 320 x 200, you'll see that the higher resolution mode will reduce the vertical proportions of the letters by half. If you prefer the proportions you saw in the lower resolution just capture your text as a brush; go into the "Brush" menu and select "Resize"; then on the sub-menu choose "Double Vert," and your letters will be returned to their former shapes.

X. THE FILL TOOL:

The Fill Tool is located just to the right of the Hollow/Filled Circle Tool, on the top row; symbolized by an irregular shape, half-filled with a solid color. When selected by clicking with either mouse button while the mouse pointer is inside it's square, it becomes a light grey shape on a dark background. This tool enables you to fill an enclosed shape with the color of your choice.

There are four available methods of filling an enclosed shape; the first two are accessible from the FILL TOOL gadget, and the last two are accessible from the Free Draw Tool and the Lines Tool, respectively. They are all described here for purposes of comparison:

1. BACKGROUND FILL: ("F" from the keyboard)

The chosen fill color will spread to all of the adjoining pixels which are the same color as the pixel on which the mouse pointer is placed when either button is pushed (left for Foreground Color; right for Background Color). The filling will stop when pixels of a different color are encountered on all sides of the fill area. This mode is automatically selected when you first click on the Fill Tool. When you move the mouse pointer into the painting area, the abbreviation, "BACK" will appear under the crosshairs.

2. BOUNDARY FILL: ("F" from keyboard twice)

This tool toggles with Background Fill. The chosen color will fill an area bounded by pixels of a chosen boundary color; covering up all other colors within the boundary area.

To select this tool, just click either mouse button on the Fill Tool a second time, and the appearance of the tool symbol will change to a capital letter "B."

When you move the mouse pointer into the painting area, the abbreviation, "PICK" will appear under the crosshairs. To pick your boundary color, move the mouse pointer to a portion of the desired boundary; hold down the left mouse button and move the mouse pointer along the boundary line, watching the left side of the Fast Menu's Foreground/Background Color Display Square; when you see the color of your Boundary appearing on the right side, release the mouse button. The Foreground Color Display will revert to its former color, but the program will remember the color you selected as a Boundary when you released the button. The abbreviation under the crosshairs will have changed to "BOUN." You can now select any color with which to fill your boundaried shape.

3. FREE SHAPE FILL: ("D" from the keyboard twice)

Using this tool, the chosen color will fill an area bounded by a free-hand-drawn outline; covering up all other colors within the boundary area.

To select this mode, just click either mouse button on the Free Draw Tool (the symbol of the little free-hand squiggle) twice, and the appearance of the tool symbol will change to a capital letter "F."

Choose the color with which to fill your free-hand-drawn shape; then hold down the left mouse button while creating the outline you desire. Release the mouse button when your outline is complete, and the shape will fill with your chosen color. Use the left mouse button to fill with your Foreground Color Setup, or the right button for your Background Color Setup.

You have a choice between drawing a continuous outline around the area you want to Free Shape Fill, thereby completing the operation when you release the mouse button, or being able to edit and correct the outline before the shape is filled in. In order to be able to edit the outline, hold down the Control Key ("CTRL") while drawing your outline; releasing the mouse button will not complete the operation. You can then return to areas of the outline which you would like to correct, and redraw them. Be sure to append the corrected section(s) to the pre-existing outline by starting and ending them on pixels already present in the original outline; that way the program "knows" which segment is to be replaced by the new one. When you have completed the outline to your satisfaction, press the Space Bar to fill your freehand shape. Or, if you'd like to start over from scratch, press the ESCape Key to erase the outline you've just created.

4. POLYGON FILL allows you to define and fill any shape surrounded by a series of straight lines.

Click a second time on the Lines Tool with either mouse button; a capital "F" will appear in place of the straight line symbol to indicate that Filled Polygon has been selected. Position your crosshairs wherever you want to begin defining your polygon and click either one of the mouse buttons; a straight line will be maintained between this point of origin and your crosshairs as you move to the location of your next point. Click either mouse button to set each successive point. It makes no difference which mouse button you use UNTIL you set your LAST point; the button used for that one determines whether or not you will be filling the polygon with the currently selected Background or Foreground Color. The selected color(s) can also be changed any time prior to the placing of that final point in the polygon. When your polygon is complete you can activate the fill by pressing the Space Bar, or abort the operation by pressing the ESCape key.

Each of the above fill modes will work with each of the drawing modes selectable from the Mode Menus, such as "NORMAL," "BLEND," "ADD," or "SUBTRACT."

XI. THE MAGNIFICATION TOOL: ("M" from the keyboard)

Just to the left of the paint roller, on the bottom row of tool gadgets, is the symbol of a little magnifying glass. Select this by clicking on it with either mouse button; it will become light grey on a dark background, and when you move the mouse pointer back to the painting area, it will have become an identical little symbol of a magnifying glass. Position it at the approximate center of the area you wish to have magnified, and click either mouse button.

The magnification window will appear on the screen, and if it happens to be behind the Fast Menu, you can easily reposition it by locating the mouse pointer over the "Drag Bar" (at the top of the window), and, holding down the left mouse button, dragging the window to a different position on the screen. You can also relocate the Fast Menu in the same fashion.

Once you have the magnification window in a convenient position, you can experiment with its many features:

1. RESIZING: In the lower right corner of the magnification window you'll find the Resize gadget. It looks like a smaller rectangle touching the upper left corner of a larger rectangle. Place the center of the mouse pointer right on this gadget, and, holding down the left mouse button, pull the corner of the window in any direction you desire, and watch the temporary outline of the window dimensions until you're satisfied, then release the left mouse button; the window will be redrawn.

2. SCROLLING: Notice the four arrows in the upper right corner of the window frame. Clicking the left mouse button on any one of these arrows will move the window across the magnified image in the direction indicated.

The four arrow keys on your Amiga's keyboard will also perform this function.

3. CHANGING THE DEGREE OF MAGNIFICATION: The bottom of the window frame contains the gadgets provided to adjust the level of magnification within the window. To utilize the gadgets, just locate the center of the crosshairs over them and click the left mouse button. From left to right:

"-" and "+" will decrease or increase the amount of magnification, respectively, and can also be typed from the keyboard, with or without the Shift key.

Pressing Shift ">" or Shift "<" from the keyboard will also perform the increase and decrease operations, respectively.

"M" will produce another little magnifying glass symbol, enabling you to select another area of the painting to magnify by centering the symbol over the desired area, and clicking the left mouse button.

"Min" will reduce the image within the window to the minimum degree of magnification.

"Max" will increase the image within the window to the maximum degree of magnification.

"Mid" will adjust the image within the window to a degree of magnification inbetween "Min" and "Max."

"B" will correct the right-hand window border after drawing directly over it.

XII. THE SCISSORS TOOL: ("B" from keyboard)
THE LASSO TOOL: ("B" twice)
THE POLYGONAL BRUSH CUTTING TOOL: ("B" thrice)

1. THE SCISSORS TOOL: You'll find the symbol of the scissors just to the right of the Fill Tool. Click on its square using either mouse button; the scissors will appear light grey on a dark background, and when you move the pointer onto the painting area you'll find perpendicular lines intersecting at the center of the crosshairs. First, position the crosshairs at one corner of an area on the screen which you'd like to pick up and copy as a "brush." Then, holding down the left mouse button, move the crosshairs in any direction needed to surround the desired area. When you are satisfied with the placement of the resulting frame, just release the left mouse button, and the new copy will lift away from its former position in the painting without deleting the original. Should you wish to pick up a portion and remove it from the painting altogether, use the right mouse button. The "brush" which you've picked up can be repositioned anywhere on the screen and stamped down by clicking the left mouse button when you've placed the brush in its new location.

You can jump to a clean spare screen by typing "J" on the Keyboard, and your custom "Pic Brush" will remain in memory and move there with you to be used in a separate work of art.

2. THE LASSO TOOL: If you click the left mouse button twice on the scissors gadget, a symbol of a Lasso will appear; light grey on a dark background.

Using this tool you can draw a freehand line around any portion of your artwork, and create a "Pic Brush" of any irregular shape. Use of the left mouse button during the outline process will cause a copy of the freehand brush to be picked up; using the right mouse button will remove the original from the screen, making your brush the only existing copy. If you have removed the original copy from the screen accidentally, you can use the "UNDO" gadget to restore the original copy to its former position

You have a choice between drawing a continuous outline around the area you want to pick up as a brush and completing the operation when you release the mouse button, or being able to edit and correct the outline before the brush is picked up. In order to be able to edit the outline, hold down the Control Key ("CTRL") while drawing your outline; releasing the mouse button will not complete the operation.You can then return to areas of the outline which you would like to correct, and redraw them. Be sure to append the corrected section(s) to the pre-existing outline by starting and ending them on pixels already present in the original outline; that way the program "knows" which segment is to be replaced by the new one. When you have completed the outline to your satisfaction, press the Space Bar to pick up the brush.

3. THE POLYGONAL BRUSH CUTTER: If you click the left mouse button three times on the scissors gadget, the symbol of a diamond shape with a freehand tail will appear; light grey on a dark background.

Using this tool you can draw an outline composed of an unlimited (except, of course, by absolute memory constraints!) number of straight line segments around any portion of your artwork, and create a "Pic Brush" of any polygonal shape. Each time you click the mouse button, a point will be established from which the next straight line segment will originate. Use of the left mouse button during the outline process will cause a copy of the freehand brush to

be picked up; using the right mouse button will remove the original from the screen, making your brush the only existing copy. The mouse button you use when setting the final point of your polygon will be the one which determines whether or not the brush is picked up completely, or just copied.

XIII. THE RESTORE PREVIOUS BRUSH TOOL: (Shift-"B" from the keyboard)

Just to the left of the Pix Tool, on the bottom row of tool gadgets, you'll see the symbol of a paint roller. This tool enables you to recall the last custom "Pic Brush" you created just prior to specifying one of the standard brushes from the Brush Gadget. Select this gadget by clicking on it with the left mouse button, and watch your last custom "Pic Brush" reappear!

MEMORY MANAGEMENT: In circumstances where memory is running low (attempting memory intensive functions on a 512K machine), the program will disable the Restore Previous Brush function in order to utilize the buffer in which the previous brush is normally stored.

In order for the user to have the option of maintaining the "brush" function even though the attempted memory intensive operation will be compromised, the option "Keep Brush" has been included in the Prefs Menu. When this option has been selected, an "X" appears inside the small circle to the left of the item.

If no previous brush has been stored in memory, the symbol of the paint roller in its Toolbox square will be dimmed.

XIV. THE UNDO GADGET: ("U" from the keyboard)

At the far right end of the top row of tool gadgets is a square which reads "UNDO." This literally enables you to undo the last operation you performed on the painting. As soon as you click either mouse button on this gadget, your most recent action will be undone.

MEMORY MANAGEMENT: In circumstances where memory is running low (attempting memory intensive functions on a 512K machine), the program will disable the "UNDO" function in order to utilize the Undo Buffer.

In order for the user to have the option of maintaining the "UNDO" function even though the attempted memory intensive operation will be

compromised, the option "Keep Undo" has been included in the Prefs Menu. When this option has been selected, an "X" appears inside the small circle to the left of the item.

If memory is insufficient to allow a particular requested function, and "Keep Undo" has been selected, the "UNDO" tool will appear ghosted.

XV. THE PIX TOOL:

Just below the Undo Gadget is a square which reads "Pix." This tool enables you to transform portions of your painting into a mosaic effect by averaging the colors of existing pixels into larger pixels, or "pixelizing." When you click either mouse button on this gadget, the word "Pix" will appear light grey on a dark background, and the title "PIX: 5" will appear in the Drag Bar of the Fast Menu. The number "5" refers to the level of pixelization which will occur, the number of pixels averaged, and the size of the resulting pixels.

You can change the level of pixelization by using the "0" and the "-" keys on the numeric keypad to the right of your keyboard. The "-" key lowers the level of pixelization, and the "0" key increases it. The number following the word "PIX:" will change accordingly from "2" through "20."

Select the areas of your painting you wish to pixelize by holding down either mouse button as you draw over them. You can change the level of pixelization "on the fly" by using the "-" or "0" keys during the operation.

LOCATING THE COLOR PALETTE:

The 64 squares of the color palette are located on the left side of the Fast Menu. The Fast Menu will automatically appear at the top of the screen when the program is first loaded.

THE EXTENDED FAST MENU:

There is an extension of the Fast Menu which can be revealed by clicking the left mouse button while the pointer is over the two little arrows in the upper right hand corner of the Fast Menu, or by pressing the Return Key. The Extended Fast Menu will then appear, containing some additional color controls. The Extended Fast Menu can be toggled back off again by pressing the Return Key or by selecting the two little arrows in the upper right corner again.

SELECTING A SET OF COLORS:

I. FOREGROUND AND BACKGROUND COLORS:

The Foreground Color is selected by moving your mouse pointer to one of the 64 colored squares in the Palette, and clicking the left mouse button. The chosen square will then be surrounded by a white border, and the color will be shown in the left hand side of the Foreground/Background Color Display Square to the right of the Palette.

The Background Color is selected by moving your mouse pointer to one of the 64 colored squares in the Palette, and clicking the right mouse button. The chosen square will then be surrounded by a dotted black and white border, and the color will be shown in the right hand side of the Foreground/Background Color Display Square to the right of the Palette.

II. THE COLOR SELECTION SQUARES:

Notice that each time a new Foreground Color is selected, the three large Color Selection Squares just below the palette, on the Extended Fast Menu, change in appearance. A pair of white dots are located on the horizontal sides of each square, and another pair are on the vertical sides of each square. Picture a line connecting each pair of dots; the pixel at which they intersect should match the Foreground Color you have just chosen.

The three large Color Selection Squares represent sections of a 3-dimensional cube which contains all 4096 colors.

III. THE RGB SLIDERS:

There are three horizontal bands of color just to the right of the three Color Selection Squares; these are the RGB (Red, Green, Blue) Sliders. They, too, will display the Foreground Color you have just selected; between two white dots on their horizontal sides.

These RGB Sliders represent the 16 incremental values of Red, Green, and Blue present in a chosen Foreground Color.

IV. THE HSV SLIDERS:

On the lower right corner of the Extended Fast Menu are the three HSV (Hue, Saturation, Value) Sliders. These sliders represent the separate components of Hue, Saturation and Value present in a chosen Foreground Color.

MIXING COLORS:

You can use these large Color Selection Squares, the RGB Sliders, and the HSV Sliders, to help you mix the colors you want to include in your palette.

If you find a small color palette square containing a color close to the one you want, select it; then go to the Color Selection Squares, and/or the RGB Sliders, to explore the derivatives of the selected color which will be displayed. Position the mouse pointer over an area of one of the Color Selection Squares containing a color closest to the one you want, and click the left mouse button. That color will replace the one in the palette square containing your chosen Foreground Color. You can then fine tune your color using the RGB Sliders. When you move along one of them, the others remain stationary; you are altering only one Red, Green or Blue value at a time, thus producing the most subtle of changes.

The upper HSV Slider alters the Hue of the selected Foreground Color. Move the slider, and the color changes from one end of the spectrum to the other. You'll find the same color at either end of the bar, with the rest of the spectrum spread out in between.

The middle slider alters the Saturation of the chosen Foreground Color, and the bottom slider alters the Value. To understand the interrelationship between the two, move them both to the far right. Whatever Hue is selected is now fully saturated (pure), and contains no trace of white or black. Moving the Saturation slider to the left reduces the purity (saturation) of the color by adding white. Moving the Value slider to the left darkens the value of the color by adding black.

CREATING A SPREAD OF COLORS:

It is possible to compute an exact spread between any two selected colors on the Palette using either the RGB or the HSV protocol.

I. THE RGB SPREAD GADGET:

Select the color with which you want to begin the spread; move the mouse pointer into the vertical rectangle which contains the letters "RGB"; click the left mouse button; then select the target color. The program will then incrementally change the Red, Green and Blue components of the first color until the target color is achieved, using the number of steps allowed by the number of palette squares inbetween.

II. THE HSV SPREAD GADGET:

Select the color with which you want to begin the spread; move the mouse pointer into the vertical rectangle which contains the letters "HSV"; click the left mouse button; then select the target color. The program will then incrementally change the Hue, Saturation and Value components of the first color until the target color is achieved, using the number of steps allowed by the number of palette squares inbetween.

THE COPY GADGET:

A color can be copied from one position on the palette to another using the Copy gadget. First, select the color you wish to copy as either a Foreground Color or a Background Color; then move the mouse pointer into the horizontal rectangle which contains the word, "COPY," and click the left mouse button; then move the mouse pointer to the color square into which you want the first color copied, and click the appropriate mouse button (left for Foreground Color, right for Background Color).

THE SWAP GADGET:

You can cause two colors to trade places on the palette by using the Swap Gadget. Select the first color as either a Foreground or a Background Color, then move the mouse pointer into the horizontal rectangle which contains the word "SWAP," and click with the left mouse button. Then select the color you want to switch with the first color, and click with the same mouse button you used there (left for Foreground Color, right for Background Color). Their positions will then be reversed.

THE ALPHA-NUMERIC COLOR READOUTS:

Under the Foreground/Background Color Display Square you will notice three white numbers and/or letters. These represent the sixteen Red, Green and Blue values of the chosen Foreground Color from zero through fifteen, Red, Green, Blue. The letters "A" through "F" represent the double digit values "10" through "15" (so that a single space can be used in the display). These readouts are useful when seeking to duplicate any particular color; you can make note of the RGB value readouts and recreate any color you have selected out of 4096.

Ordinarily, the readout displays the RGB values of the currently selected Foreground Color. If you would like to see the RGB values of the currently selected Background Color, hold down the right mouse button while your pointer is located within the selected Background Color's palette square; that color's RGB values will be displayed beneath the Foreground/Background Color Display Square using black characters on white.

Any color can be reproduced by adjusting the levels within the RGB color sliders an increment at a time until the alphanumeric color readouts of the desired color are duplicated.

5 The Preferences Menu

On the Main Menu bar at the top of the screen, to the right of the "Project" Menu is the abbreviation "Prefs"; this refers to the Preferences Menu. This menu allows you to decide among a number of convenience features.

SCREEN MODE...: (Right Amiga Key-"M" from the keyboard)

The selection, "Screen Mode..." includes the three dots which indicate that a window will appear; allowing you to make some additional decisions and/or enter some data.

The window will contain the following gadgets:

I. NTSC:

When your Amiga is operating on the NTSC standard, the program will display this gadget clearly; "ghosting" and disabling the PAL gadget.

II. PAL:

When your Amiga is operating on the PAL standard, both the NTSC and PAL gadgets are selectable, the default being NTSC.

III. INTERLACE:

Clicking the left mouse button while inside the Interlace gadget will change the screen display mode to HAM interlace: 320 X 400.

The change in width and height will be reflected in the Width and Height readout on the lower half of the window. To return to non-interlace, 320 X 200, just click on the gadget again.

IV. OVERSCAN:

Clicking the left mouse button while inside the Overscan gadget will change the screen display mode to overscan (filling the entire monitor screen; no visible borders).

The change in width and height will be reflected in the Width and Height readout on the lower half of the window. To return to non-overscan, 320 X 200 or 320 X 400, just click on the gadget again.

When you have completed your operations in this window select "OK" to return to the normal screen.

Should you change your mind about altering any of the settings in this window, return to the normal screen by selecting "CANCEL."

EXACT COLOR: (Amiga Key-"E" from the keyboard)

This is the second choice on the "Prefs" menu; when this option has been selected, an "X" will appear in the small circle to the left of the words, "Exact Color"; if you de-select this item, the "X" will disappear. With this option selected, PHOTON PAINT will put pixels of exactly the chosen color on the screen.

This function is significant, because HAM mode usually translates the selected color based upon the color of adjacent pixels. With Exact Color selected, the program will paint with the selected color, and adjust the colors of adjacent pixels instead.

The default position of this selection is ON.

KEEP UNDO: (Amiga Key-"U" from the keyboard)

Selecting this option will prevent the UNDO function from becoming disabled in circumstances where a memory intensive function is requested by a user whose computer does not have sufficient memory available to complete the operation without using the undo buffer.

If available memory is low, and this option has been selected, the "UNDO" gadget will appear as if it has been selected; light letters on a dark background.

KEEP BRUSH: (Amiga Key-"B" from the keyboard)

Selecting this option will prevent the "Restore Previous Brush" function from becoming disabled in circumstances where a memory intensive function is requested by a user whose computer does not have sufficient memory available to complete the operation without using the Previous Brush buffer.

FAST BRUSH: (Amiga Key-"F" from the keyboard)

Selecting this option will cause your chosen brush to be pasted into the screen

much faster, allowing continuous "drawing" with a brush. Non-HAM paint programs can perform this function more quickly because they do not have to correct for the HAM fringing, so allow some extra time for PHOTON PAINT to perform this function. "Fast Brushes" will also require more memory than ordinary brushes, and only work in Normal Mode with Transparency off.

CLEAR TO FIRST:

When this item is selected, all Clear the screen and/or Merge To Next operations will treat the color in the first Palette square (top row, far left) as the transparent/background color. This feature is especially helpful when you have used the BgMode menu to setup special painting modes for your right mouse button (which paints with the currently selected Background Color) and you'd rather not have to deselect this setup in order to clear the screen or merge using "color 0" (the first palette color). This way, you can continue to use your background painting mode setup with any Palette square selected as your Background Color, and use "color 0" for clearing or merging operations.

LOAD PROMPTING:

When this option is selected, you will be prompted whenever you attempt to load a picture which has a resolution different from the current screen.

The prompt window will ask you if you wish to change the screen resolution to that of the picture you have selected to load; it will specify that resolution, and you must select either "Yes" or "NO" to return to the screen or load the requested picture.

If you would rather not be prompted in such situations do not select this option; the program will automatically switch resolutions when loading pictures of a resolution different from the current screen.

NOTE: Variations in the ANIM compression format exist among Amiga graphics programs; therefore some ANIM files created using other programs may not load into PHOTON PAINT. Only HAM ANIM files using the same screen size set in PHOTON PAINT at the time of loading, and compressed using "Bytes Vertical

Compression" are supported. New versions of some animation programs do use this type of file.

The default position of this selection is ON.

COORDINATES:

Selecting "Coordinates" will cause a set of numbers to appear on the right side of the "drag bar" at the top of the Fast Menu. These numbers represent the exact position of your mouse crosshairs on the screen, according to the number of pixels from the left side of the screen and from the top of the screen, respectively.

During operations for which either mouse button is continuously held down, the readouts will indicate the distance (in pixels) traveled from the origin of the mouse move.

→ WORKBENCH:

To reveal the Workbench screen which is normally behind the painting screen, you must move your mouse pointer to the word "SCREEN" in the upper left corner of the Fast Menu (inside the drag bar), and, holding down the left mouse button, pull down the painting screen; the Workbench screen will appear behind it (unless Photon Paint has closed it to save memory).

The Fast Menu will not disappear completely; the drag bar of the painting screen will remain at the bottom of the Workbench screen so you cannot accidentally be stuck in Workbench.

When you have completed your Workbench operations, use the left mouse button inside the word "SCREEN" to pull the painting screen back up, and in front of the Workbench screen.

FOLLOW MOUSE:

This device allows you to force the program to create a line which exactly traces the path of the mouse, even if the mouse is moved so rapidly that the drawing function must catch up later.

When this function is de-selected, the drawing function will attempt to keep up with the most rapid movements of the mouse by cutting off corners and/or curves.

→ MOUSE SPEED:

When you highlight the option, "Mouse Speed," a sub-menu with three choices will appear: Fast, Medium, and Slow. The choice which is currently in effect will show an "X" in the little circle to the left of the word. Experiment with the three speeds to learn the relative feel of each. The slow speed can be useful for very tight work, and the fast speed for using the mouse to perform the more utilitarian functions.

SCREEN OFFSET...:

This option allows you to customize the position of your screen display.

Once you've selected this item, a window will appear containing a black square which has a small grey square inside. Position your mouse pointer over the small grey square, hold down the left mouse button, and move the small square around inside the large black square; notice that the screen display relocates according to your movement of the small square.

When you are satisfied with the position of the screen display, release the left mouse button, and select the "OK" gadget. If you decide not to save your changes in the screen offset, select "CANCEL."

SAVE PREFS:

This option allows you to save your selections on the Preferences Menu.

Select this item after you have selected and set your personal preferences on the menu; the data will be saved on the program (SYS:) disk in the S: directory under the filename "PP. Preferences. The next time the program is loaded, it will look in this file for the preferences settings, and boot up with them all in effect.

6 The Brush Menu

The third word which appears in the Main Menu bar when you've placed your mouse pointer at the very top of the screen, and held down the right mouse button, is "Brush." The "brush" referred to here is a custom "pic-brush" which you've picked up from a portion of the screen using the Scissors Tool, as described in chapter 4, "The Fast Menu and the Color Palette."

The first two choices on the Brush Menu allow you to recall a previously stored brush from disk, or to store a newly selected brush.

LOAD...: (Amiga Key — "O" from the keyboard)

Move down the Brush Menu to the word, "Load..." and release the right mouse button. A window will appear which is just like the "Load" window on the Project menu, except that the title at the top of this window will read, "Load Brush."

Beneath the String gadget (area in which the user can enter data) labeled "Drawer" will be a group of gadgets representing the storage devices which PHOTON PAINT finds present in your system. Any of the following may appear:

"/":This is known as the "Parent gadget." This gadget always appears. Select it when you want the program to step one stage backward in the directory heirarchy, and list the contents of that directory (drawer). The directory in which the file and directory names you see listed in the requester are located is considered to be their "Parent" directory. Picture a series of nested drawers; you open one and find others inside, etc.

"df0:," "df1:," "df2:," etc.: These gadgets represent your first disk drive, your second disk drive, your third disk drive, etc.; whether internal or external. Select the gadget representing the disk drive which contains the data disk you want the program to read and list the contents of in the requester. By default, Photon Paint will begin to read the program disk when the requester first appears. As soon as you select the appropriate disk drive gadget, the program will begin to read and list the contents of the disk in that selected drive.

"dh0:," "dh1," etc: These gadgets represent your first hard disk drive, your second, etc. If you have stored data that you want to load into PHOTON PAINT on a hard disk drive, select the appropriate hard drive gadget to cause the program to read and list the contents of that device.

"ram:": This gadget represents Random Access Memory, which can be treated as a device in which data can be stored. The entire contents of "ram" is lost whenever you turn off your computer, so it is normally used for temporary storage only. Select the "ram" gadget if you have stored data there and want to list the filenames in the requester.

Beneath the large, grey requester box will be a String gadget labeled "Pattern," and two other gadgets to its right: "*," and "*.PIC." These three gadgets pertain to possible extensions which may exist at the end of the filename(s) you want to look for on your data disk.

If you have chosen not to create a special drawer (dir) for brushes, or not created any directories at all, it would be helpful to append an "extension" to the filenames which will let you know whether a filename refers to a brush or a picture. I've used the extension, ".pic" for pictures, or ".bsh" to indicate a brush.

".Pic" is the extension often used to indicate a picture file. If you know that the file you are looking for contains the extension ".pic," you can select this gadget to confine the listings in the requester to files with that extension.

The "Pattern" String gadget can be used to enter whatever extension pattern appears at the end of the file(s) you wish to list in the requester. Select the String gadget to locate the cursor inside the black bar, and type in the appropriate extension, preceeded by a period (".."). Press the return key to cause the program to search for any file(s) with the extension you have entered.

The "*" gadget is to be selected in the event you have previously limited the file search to a particular pattern, but you now want to remove the pattern restriction and cause the program to list all files on the disk, regardless of extension.

The disk will be examined and all its files and/or directories (also known as "drawers") will be listed in the large grey requester box.

Select either the filename of your brush, or the name of a drawer in which you've saved a brush file by clicking the left mouse button when your pointer is over the name of that file or drawer (dir). If you've selected the filename of a brush, that name will now appear in the String gadget labeled "File." If you have selected a directory (dir) the names of all brushes stored there will appear in the large grey requester, and the name of the (dir) will appear in the String gadget labeled, "Drawer." Select the filename of the brush you want to load so that the filename appears in the String gadget labeled "File."

If you already know the filename of the brush you wish to load, you can save time by selecting the String gadget labeled "File" so that the cursor appears inside the black bar, and typing in the filename. This way you do not have to wait for the program to list all the filenames in the requester.

Now load your brush by placing the mouse pointer over its name, and clicking the left button; the name will appear in the black bar labeled "File," and when you click the left mouse button in the gadget which reads, "LOAD," the window will disappear, and the brush will soon appear on the screen.

You can Load your brush more rapidly by positioning your mouse pointer over its filename when it appears in the large grey requester box, and clicking the left mouse button twice, quickly. When the brush appears, it will be attached to the mouse pointer as if you had just picked it up from another screen. This is convenient because you don't have to worry about where the brush will appear on the painting; therefore, you can have a painting on screen prior to loading a new brush, and position it wherever you wish after it is loaded.

If you change your mind, and decide you do not want to load a brush, select the "CANCEL" gadget and you will be returned to the painting screen.

SAVE AS...:

Once you have used the Scissors Tool and selected a portion of your painting as a "brush," you can save it to disk for future use. Do not place the brush down on the screen; leave it attached to the mouse pointer. Now move the

mouse pointer to the very top of the screen and hold down the right mouse button; the Main Menu bar will appear. Move over to "Brush"; then down to "Save as..." and release the right mouse button. The requester which will appear is just like the "Save as..." requester on the Project menu, except that the title at the top of this window will read, "Save Brush".

Beneath the String gadget labeled "Drawer" you will see a group of gadgets containing the following, from left to right:

"/":This is the Parent gadget. This particular gadget always appears. Select it when you want the program to step one stage backward in the directory heirarchy, and list the contents of that directory (drawer).

"df0" and, depending upon the configuration of your system, any of the following: "df1," "df2," "dh0," "dh1," etc. These represent your floppy disk drive device(s) and your hard disk drive device(s). By default, Photon Paint will begin to read the program disk when the requester first appears. As soon as you select the appropriate disk drive gadget, the program will begin to read and list the contents of the disk in that selected drive.

"ram:": This gadget represents Random Access Memory, which can be treated as a device in which data can be stored. Select this gadget if you want to use RAM for temporary storage of a file; remember that the contents of RAM will be lost if you turn off your Amiga or perform a "Warm Boot."

These gadgets are discussed in greater detail under the heading "LOAD," above.

Beneath the large, grey requester box will be a String gadget labeled "Pattern," and two other gadgets to its right: "*," and "*.PIC." These three gadgets pertain to possible extensions which may exist at the end of the filename(s) you want to store on your data disk.

The "Pattern" String gadget can be used to enter whatever extension pattern you have saved at the end of the file(s) you want to locate in the requester. Select the String gadget to locate the cursor inside the black bar, and type in the appropriate extension, preceeded by a period ("."); then press the return key to cause the program to list all filenames with the extension you have entered. For example, I use the extension ".bsh" to designate Brush files.

The "*" gadget is to be selected in the event you have previously limited the file search to a particular pattern, but you now want to remove the pattern restriction and cause the program to list all files on the disk, regardless of extension.

".Pic" is the extension often used to indicate a picture file, and would not be used in the event you wanted to save a Brush.

After you have selected the appropriate disk drive device, the disk will be examined and all its files and/or directories (also known as "drawers") will be listed in the large grey requester box.

If you have created a drawer (dir) in which to save your brushes, select its title. It will appear in the black bar labeled, "Drawer"; then enter the name you've chosen for your brush in the black bar labeled, "File." As soon as you begin typing, the letters will automatically appear in this File bar.

If you have not created a drawer for brushes, just type in your chosen filename; it will appear in the File bar. The backspace and delete keys control the cursor within the bar, in case you need to correct your entry. Now click the left mouse button in the "SAVE" gadget and your custom "pic-brush" will be saved to disk.

The other choices appearing on the Brush Menu are a variety of special graphic manipulations which can be performed on the selected "brush":

TRANS: (ALT-"R" from the keyboard)

This option allows you to specify that the Background Color of your custom brush will be transparent when you pick it up and/or when you click it down on the screen. Otherwise, the Background Color will overlay whatever painted area is beneath the rectangular dimensions of the brush frame.

To select this item, hold down the right mouse button and move your mouse pointer down the Brush Menu until the word "Trans" is highlighted; then release the button. You can also select by clicking the left mouse button while you're holding down the right mouse button and the word "Trans" is highlighted. An "X" will appear in the small circle to the left of the word, and the item will remain selected until deselected using the same procedure.

This function can be performed from the keyboard by holding down either of the "ALT" keys, and pressing the "R" key.

SOLID: (ALT-"O" from the keyboard)

This function allows you to stamp your selected "pic-brush" into the screen as a solid-colored silhouette. After this option has been selected, an "X" will appear within the little circle to the left of the word "Solid" on the Menu, and if the brush is stamped into the screen using the left mouse button the silhouette will appear in your currently selected Foreground Color; using the right mouse button will create a silhouette in your current Background Color.

➔ FLIP:

Your next option will be to flip your custom brush, either horizontally ("Horiz") or vertically ("Vert"). Hold down the right mouse button, and move the pointer down the Brush Menu to the word, "➔ Flip," and the sub-menu will appear, showing your two choices, "Horiz" and "Vert."

If you select "Horiz" by releasing the mouse button, the brush will be flipped horizontally, (the left and right sides will be reversed), and if you select "Vert," the brush will be flipped vertically (reversed top and bottom). Type ALT-"X" to flip the brush horizontally, or ALT-"Y" to flip the brush vertically from the keyboard.

➔ RESIZE:

This menu selection provides several means of changing the size of your custom brush. Hold down the right mouse button and move the pointer down the Brush menu to the word, "➔ Resize," and the sub-menu will appear, containing the following options. Choose the option you prefer by releasing the right mouse button while your pointer is over the particular word, and it is highlighted.

I. FREE: ALT -"S," from the keyboard:

When this option is selected, your brush will reappear on the screen with the word "SIZE" attached to the lower right-hand corner. Hold down the left

mouse button, and a hollow white rectangle the original size of the brush will appear; as you move the mouse, the size of the hollow rectangle will change. When the rectangle seems to be in the proportion desired, release the mouse button; the program will take a moment to compute the appearance of the new brush.

II. DOUBLE: ALT -"D," or Shift -"H" from keyboard:

This option will exactly double the size of your brush.

III. DOUBLE HORIZ:

This option will double the brush in the horizontal direction only.

IV. DOUBLE VERT:

This option will double the brush in the vertical direction only.

V. HALVE: ALT - "H," or just "H" from the keyboard:

This option will reduce the size of the brush by exactly half.

VI. HALVE HORIZ:

This option will reduce only the horizontal dimensions of the brush by half.

VII. HALVE VERT:

This option will reduce only the vertical dimensions of the brush by half.

➔ ROTATE:

This option will allow you to rotate the brush image to varying degrees. Hold down the right mouse button and move down the Brush Menu to "➔ Rotate"; then examine the sub-menu which will appear. Choose an item from the sub-menu by releasing the mouse button while the item is highlighted.

I. FREE: (ALT - "Z" from the keyboard)

Selecting this item will allow you to rotate the brush freely, using the lower left corner as the pivot point.

Move the mouse pointer back into the drawing area, and the brush will reappear with the crosshairs attached to the lower right corner, and the abbreviation "ROT" listed below. Hold down either mouse button; the brush

will become a hollow white rectangle. Now move the mouse in a circular path. The rectangle will follow the movement of the mouse, pivoting on the lower left corner of the rectangle. You can rotate the image an entire 360 degrees. Once satisfied with the position of the rectangle, release the mouse button; the brush will be redrawn in a few moments.

II. +90: (ALT - "0," or just "Z" from the keyboard)

When this item is selected, the program will take a few moments; then display the brush rotated 90 degrees clockwise.

III. -90: (ALT -"9" from the keyboard)

When this item is selected, the program will take a few moments; then display the brush rotated 90 degrees counter-clockwise.

IV. 180:

When this item is selected, the program will take a few moments; then display the brush rotated 180 degrees: upside-down.

➔ WRAP ON:

This option enables you to wrap your custom brush around a variety of 3-D shapes, listed below. The process involves expanding the outline of your chosen shape inside the rectangular confines of your brush. If you want to cancel the process before releasing the mouse button, press the OTHER mouse button, and you can begin over again. If you want to abort a wrap already in progress, press the ESCape key.

Hold down your right mouse button and move down the Brush Menu to the words "➔ Wrap On." There will be a sub-menu with several options available.Select one by releasing the mouse button while your selection is highlighted.

I. TUBE: (ALT-"U" from the keyboard)

This option will allow you to wrap your brush around a vertical tubular shape which is the same height as the brush. The brush will reappear on screen with the crosshairs attached to the upper right-hand corner; the word "TUBE" will appear beneath them.

Hold down either mouse button, and the brush will become a hollow white rectangle. Move the mouse to the left in order to set the width of the tube. It cannot be any wider than the original brush, so moving the mouse to the right will not change the dimensions of the rectangle. When you are satisfied with the shape of the tube, release the mouse button. A few moments later the new, tubular brush will appear.

II. CONE: (ALT-"C" from the keyboard)

This option will allow you to wrap your brush around a vertical conical shape which is the same height as the brush. The brush will reappear on screen with the crosshairs attached to the lower right-hand corner; the word "CONE" will appear beneath them. Hold down either mouse button, and a hollow white cone will appear; the base of the cone will be the same width as the base of the brush. Move the mouse to the left to adjust the width of the base. Moving the mouse to the right will have no effect, as the base of the cone can be no wider than the base of the brush. When satisfied with the width of the cone, release the mouse button, and after a few moments the cone shaped brush will appear.

III. BALL: (ALT-"B" from the keyboard)

This option will enable you to wrap your brush around a sphere. The brush will reappear on screen with the crosshairs in the center of the brush; the word "BALL" will extend beneath them.

Hold down either mouse button and move the cross-hairs away from the center of the brush; a hollow white circle will appear, and widen as you move the mouse outward. The circle will automatically stop when you reach any edge of the brush. When you're happy with the size of the circle, release the mouse button, and after a few moments your spherical brush will appear.

IV. ELLIPSE: (ALT-"E" from the keyboard)

This option will enable you to wrap your brush around an ellipse. The brush will reappear on screen with the crosshairs in the center of the brush; the abbreviation "ELPS" will extend beneath them.

Hold down either mouse button and move the crosshairs away from the center of the brush; a hollow white oval will appear, and grow as you move the mouse outward. The ellipse will automatically stop when you reach any edge of the brush. Because an ellipse is more variable, you can reach the edges of your brush in one direction, and still adjust the dimensions of the ellipse in the other direction. When you're happy with the shape of the oval, release the mouse button, and after a few moments your elliptical brush will appear.

V. FREE: (ALT-"F" from the keyboard)

This option will enable you to wrap your brush around a free-hand drawn shape. The brush will reappear on screen with the crosshairs positioned in the center of the image; the word "FREE" will appear beneath them. Hold down the left mouse button, and an outline will appear which represents the the rectangular shape of the brush. The crosshairs will be located in the center. WITHOUT holding down either mouse button, move the mouse inside the rectangle until the crosshairs are positioned where you wish to begin drawing your free-hand shape.

You have the choice of designing either a symmetrical or an asymmetrical shape. If you hold down the left mouse button while drawing on either the right or left side of the rectangular outline of your brush, a matching profile will be drawn on the other side, creating a symmetrical, free hand outline. If you want to create an asymmetrical free hand outline, hold down the right mouse button while you draw; no matching profile will be drawn on the opposite side of the rectangle, and you can design that side separately to create an assymetrical free hand shape.

When you want to begin drawing, hold down either mouse button. You can modify the profile of your free-hand shape indefinitely. Whenever you draw over a section which already contains a line, the old line will be replaced as the new line is added; just as when drawing ordinarily, no line will be created unless you are pressing the mouse button. When you are pleased with your free-hand shape, touch the space bar, and after a few moments the newly shaped brush will appear.

VI. CUBE 3/4: (ALT-"4" from the keyboard)

This option will enable you to wrap your brush around a 3-D cube. The brush will reappear on screen with the crosshairs in the center of the brush; the word "CUBE" will extend beneath them.

Hold down either mouse button; an outline of a cube appears. As you move the mouse around, the cube will change perspective. When you're pleased with the appearance of the cube, release the mouse button, and after a few moments your brush will reappear; wrapped around the visible sides of the cube.

VII. CUBE * 3: (ALT-"3" from the keyboard)

This option will enable you to duplicate your whole brush on each of the three visible sides of a 3-D cube. The brush will reappear on screen with the crosshairs in the center of the brush; the word "CUBE" will extend beneath them.

Hold down either mouse button; an outline of a cube appears; large enough for the brush to fit on each side. As you move the mouse around, the cube will change perspective. When you're pleased with the appearance of the cube, release the mouse button, and after a few moments your brush will reappear; reproduced on each of the visible sides of the cube.

VIII. CONTOUR: (ALT-"2" from the keyboard)

This feature allows you to conform your selected pic-brush to a 3-D "contour map." The contour map can be compared to a topographical map, representing various heights according to the relative light intensity (value) of adjacent groups of pixels. The brighter the pixels, the higher the resulting point will be on the contour map. This map can be tilted in 3-D space prior to its final calculation, using the same user-friendly interface provided in the Tilt function, and the dimensions of your pic-brush will be scaled to fit the dimensions of your selected contour map area; therefore, the wrapped brush will become the size of the contour map when the operation is completed.

The easiest way to construct a contour map is to use a range of grays from black to white, and to use the Blend requester in order to create gradient patterns and/or shapes. For example, you can create a simple hill by setting the brush dominance (white) to the center of the display rectangle in the Blend requester; then paint a filled rectangle using pure white (FFF) over a black (000) background. If you want to develop a group of hills you can paint several different filled rectangles of various sizes and shapes and position them next to each other.

The Luminosity feature functions with contour mapping, so you may want to specify a light source direction and intensity before you begin the mapping process (see LUM..., below). The inclusion of a light source will usually add to the 3-D effect produced by the contour map. Dithering and/or Fine Shading do not function with Contour.

Once you have created the gradient area to be used for the contour map and specified a light source, cut your pic-brush (use an area at least as large as your intended contour map area) and then select Contour from the Brush Menu; your crosshairs will reappear with the word "MAP" printed vertically below, prompting you to define the area to be used for the contour map. Place your crosshairs at one corner of the desired area, hold down either mouse button, and pull the rectangular outline out around it just as you would to cut out a brush. The pointer will read "Wait" for a moment; then you need to hold down the left mouse button and move the mouse in order to see the wire frame approximation of the contour map in 3-D.

Only a portion of the points are sampled in order to represent the map in wire frame form, so every variation in the contour will not be evident at this point.

An additional parameter, the Height Multiplier, will adjust the high points of the contour map, increasing or reducing them while the wire frame is displayed. To INcrease the high points, press the number "2" from the numeric keypad on the right side of your keyboard; to DEcrease the high points, press the number "1." Each successive press of either number will adjust the height further, so you can undo any changes by pressing the other number for the opposite effect.

SET AVG: (ALT-"A" from the keyboard)

This function allows you to specify an averaging parameter to smooth the transitions between adjacent height values; the higher the parameter, the smoother the transitions, and the longer the operation. The range is from "0" to "6," with the default being "3." This option is found just beneath the Contour selection, and any change should be specified prior to commencing calculation of the contour map.

You can now adjust the position of the wire frame using the same controls available for the Tilt operation (see TILT, below). Once you have achieved the desired view, press the Space Bar to begin the calculation. This process is time-consuming, so be prepared to wait several minutes if the desired map is somewhat complex. The results are comparable to a simple ray-tracing operation, but the process is much faster in comparison.

HINT: Be sure to de-select Blend by returning your painting mode to Normal before you set down your completed contour mapped brush, or you'll end up with a double blended contour brush!

➔ SPECIAL:

Highlighting this option will open a sub-menu containing the following additional brush manipulations:

I. BEND: (ALT-"N" from the keyboard)

Using this option, you can bend your brush in several directions. Select this item by holding down the right mouse button and moving down the ➔ Special sub-menu until the word "Bend" is highlighted; then release the mouse button.

The brush will reappear with the crosshairs centered above the brush, and the word "BEND" will extend beneath them. Hold down either mouse button; a rectangular outline having the same dimensions as your brush will appear.

When you move the crosshairs straight down, the middle of the rectangle will bend downward; move the crosshairs straight up, and the middle of the rectangle will bend upward. Moving slightly left or right will offset the bend of the curve in that direction; moving past the left or right margins of the

rectangle will bend the brush asymetrically to that side. When you are satisfied with the shape of the rectangle, release the mouse button to start the calculation.

All aspects of the rectangle must remain onscreen; if any portion of the final shape is moved offscreen, or its shape is so distorted that any portion is offscreen, the brush cannot be recalculated, and will reappear in its original form when you release the mouse button.

II. STRETCH: (ALT-"1" from the keyboard)

Using this option, you can stretch your brush in all four directions. Select this item by holding down the right mouse button and moving down the ➔ Special sub-menu until the word "Stretch" is highlighted; then release the mouse button.

The brush will reappear with the crosshairs centered inside the brush, and the abbreviation "STRE" will extend beneath them. Click either mouse button; a hollow rectangle having the same interior dimensions as your brush will appear. Four small hollow squares will be located at each corner; you can position your mouse pointer within each of these little squares, hold down the left button, and drag the corner of the brush in any direction; stretching it.

This method allows you to dynamically resize, flip, rotate, tilt, and twist your brush (a twist of one turn is possible; to twist further, use the actual Twist function, below). When your distortions are complete, just press the Space Bar to begin the calculations.

III. TWIST: (ALT-"W" from the keyboard)

This option will allow you to twist the brush image, creating a 3-D spiral.

Hold down the right mouse button and position the mouse pointer over the word "Twist" on the ➔ Special sub-menu; when it is highlighted, release the button.

When you move the pointer back to the screen, your brush will appear with the crosshairs attached to the right side of the rectangle; the abbreviation, "TWST" will appear below the crosshairs. Hold down either mouse button (the image will become a hollow white outline) and move the mouse either to the

left or to the right (up and/or down will have no effect). The farther left or right you move the mouse, the more twisted the outline will become. When you are satisfied with the outline, release the mouse button; the image will take a few moments to compute, and your twisted brush will then appear.

TILT: (ALT - "T" from the keyboard)

This option allows you to place your brush on a 2-D plane which is positioned in 3-D perspective on the screen. Select this item by holding down the right mouse button and moving down the Brush Menu until the word "Tilt" is highlighted; then release the button.

The brush will reappear on screen with the crosshairs in the center of the brush; the word "TILT" will extend beneath them; click either mouse button; a hollow rectangle will appear, and on the drag bar of the Fast Menu you will see three zeros "0" "0" "0."

From left to right, these zeros represent pitch, roll and yaw, respectively. Two of these adjustments can be used onscreen simultaneously; the two presently selected appear on the drag bar to the right of the three zeros.A fourth type of adjustment is distance, which does not have a "0" position.

I. PITCH:

When you drag the crosshairs up or down, you are changing the pitch of the brush; that is, tilting it up or down.

II. ROLL:

When you drag the crosshairs left or right, you are rolling the brush in either direction; pivoting around a vertical center line.

III. YAW:

When you drag the crosshairs left or right, the brush rotates around its own center, on the imaginary plane where it is located.

IV. DISTANCE:

When you drag the crosshairs up, the brush moves toward (closer to) the viewer; when you drag them down, the brush moves away (farther) from the viewer. You can repeatedly drag the crosshairs from the top of the screen to

the bottom, and move the brush farther and farther away; or repeatedly drag the crosshairs from the bottom of the screen to the top, and move the brush closer and closer. Once the brush becomes so close that a portion of it is no longer onscreen, the outline will disappear, and you must reverse the process to get it back onscreen.

NOTE: Before you can utilize the Distance option, your Brush must have a Pitch and/or Roll value other than zero.

The numeric keypad on the right side of your keyboard is used to select and/or fix these functions. When you begin your operations, Pitch and Roll are automatically selected. To lock the Pitch in the current position, press the number "7"; to lock Roll, press the number "8"; to unlock either one, press the same number again (they are toggles). To adjust Distance and/or Yaw, press the number "6," and "Dist" and "Yaw" will replace "Pitch" and "Roll" on the drag bar. Use "7" to lock Distance, and "8" to lock Yaw. If you want to adjust Pitch and/or Roll again, press the number "9." When you havelocked a function, the word will appear in white letters on a black rectangle.

NOTE: PHOTON PAINT will maintain your final Pitch, Roll and Yaw settings in case you would like to duplicate them with a subsequent Brush. If you would like to reset all three back to zero, press the zero (0) key on your numeric keypad. If you would like to zero out only the Pitch setting, press the number four (4) key, and if you would like to zero out only the Roll setting, press the number five (5).

V. SHIFT:

Shift allows you to move the brush around in a 3-D environment, linked to a perspective vanishing point. Select this function by pressing the number "3" on the numeric keypad; "Ypos" and "Xpos" will now appear on the drag bar. The first two "0" positions will show the positive or negative settings of the "Y" and "X" axes, respectively; these readouts remain the same as you hold down the left mouse button and drag the pointer around the screen; moving the brush. This is because you are changing your point of view of the brush in its 3-D environment, not the degrees of rotation on the brush.

You can lock the "Y" axis by pressing the number "7," and the "X" axis by pressing the number "8." They are toggles; to unlock them again, just press the same number another time.

Hold down either mouse button; when you move the mouse, the hollow rectangle will change perspective with the movement of the crosshairs. You can release the mouse button and reposition the crosshairs; then hold down either button again and further alter the perspective of the rectangle.

Once you are satisfied with the appearance of the outline, release the mouse button, and touch the Space Bar on your keyboard. The program will need a few moments to compute the new angle of the brush; then it will reappear in the chosen perspective.

LUM(inosity): (ALT-"L" from the keyboard)

This option allows you to specify the direction of a light source which will govern the shading of the 3-D surface your brush will be mapped upon.

Select this item by holding down the right mouse button and moving down the Brush Menu to the syllable "Lum..."; the requester which appears will bear the title, "Luminosity," and will afford you the following adjustments:

I. LUM ON:

The default setting of this gadget is "ON"; the gadget is highlighted with the words appearing black on a white background. This gadget is automatically selected upon activation of any of the setting gadgets in the Luminosity requester

II. INTENSITY:

You'll find the light source intensity slider on the left side of the requester; it allows you to adjust the intensity, or brightness of the light source on a scale from "1" to "15."

The default setting is "1." You'll see the numeral to the left of the black slider bar. Place your mouse pointer inside the small grey square in the left side of the slider bar, hold down the left mouse button, and move the pointer along

the bar to the right. The numeral "1" on the left will change as you proceed to the right until it reaches the maximum of "15." If you position the mouse pointer within the bar to either side of the grey square and click the left mouse button, the square will move one increment in that direction.

III. CONTRAST:

You'll find the Contrast slider on the left side of the requester; it allows you to adjust the degree of contrast between the light source and the subject on a scale from "0" to "15."

The default setting is "15." You'll see the numeral to the left of the black slider bar. Place your mouse pointer inside the small grey square in the right side of the slider bar, hold down the left mouse button, and move the pointer along the bar to the left. The number "15" on the left will change as you proceed to the right until it reaches the minimum of "0." If you position the mouse pointer within the bar to either side of the grey square and click the left mouse button, the square will move one increment in that direction.

IV. DITHER:

You'll find the Dither control slider on the left side of the requester; it allows you to adjust the amount of dithering used to blend the light source with the subject; creating softer passages between transitional bands of light intensity. It also uses a scale from "0" to "15."

The default setting is "0." You'll see the numeral to the left of the black slider bar. Place your mouse pointer inside the small grey square in the left side of the slider bar, hold down the left mouse button, and move the pointer along the bar to the right. The numeral "0" on the left will change as you proceed to the right until it reaches the maximum of "15." If you position the mouse pointer within the bar to either side of the grey square and click the left mouse button, the square will move one increment in that direction.

V. FULL SCALE:

This toggle gadget enables you to choose whether or not the shading function will attempt to use the full spectrum of brightness variations across the 3-D object.

The default setting is "ON" because for the most part results are best this way. There are some cases where interesting effects are produced with this function "OFF." For example, positioning the light source behind the object and not allowing a full range of shading will produce a slight glow around the outer edges of the shape.

When this toggle is "ON" the words "Full scale" are on a white background; when it is "OFF" the words are on a black background.

VI. DIRECTION:

The black square on the right side of the window is labeled "Direction." You'll see a small grey square in the center; a "0" next to the left side and another "0" underneath. This tool enables you to set the direction of the light source.

Imagine an horizontal line bisecting the large square. This line represents an 180 degree half-circle which has been straightened into a line. The 3-D object for which you will be specifying the direction of a light source is in the center of this half-circle.

Likewise, imagine a vertical line bisecting the large dark square; representing a 180 degree half-circle straightened into a line.

The default location of the small grey square indicating the position of the light source is in the center; directly in front of the object. As you move the small grey square to the left of center, the "0" underneath the large square will update from "0" to "-90" (negative numbers), and if you move to the right of center, the counter will update from "0" to "90" (positive numbers).

Likewise, when the small grey square is moved above center, the counter to the left of the large square will update to negative 90 degrees, and when the small square is moved below center the counter will update to positive 90 degrees. You can also position your mouse pointer inside the black area surrounding the small grey square, and click your left mouse button to change the setting(s) an increment at a time in the direction of your pointer.

VII. BACKLIGHT:

When this toggle gadget is selected, the light source will be located behind the object. As you move the small grey square to the left of center, the "180"

underneath the large square will update from "180" to "-90" (negative numbers), and if you move to the right of center, the counter will update from "180" to "90" (positive numbers).

Likewise, when the small grey square is moved above center, the counter to the left of the large square will update to negative 90 degrees, and when the small square is moved below center the counter will update to positive 90 degrees.

To relocate the light direction in front of the object, toggle the backlight gadget so that it is de-selected (light letters on a black background).

VIII. FINE SHADE:

This toggle gadget enables you to choose whether or not the shading function will implement a special boolean algorithm to create additional levels of lighting intensity variations across the 3-D object.

Without Fine Shading selected, PHOTON PAINT alters only the Value component of the affected colors to achieve a maximum of 16 variations in light intensity. In order to produce additional levels of intensity, the Hue and Saturation values must be altered also; necessitating some compromise in absolute color accuracy. You'll probably find that this is most pleasing when used on solid colored objects, but appears unnatural if used on digitized photographs or other realistically rendered subjects.

The default setting is "ON." When this toggle is "ON" the words "Fine shade" are on a white background; when it is "OFF" the words are on a black background. When you have set your various options in the Luminosity window, click your left mouse button while the pointer is in the "OK" gadget in the lower left corner. If you choose not to save the new settings, select "CANCEL" in the lower right.

REMAP:

This option restores the original colors of your brush after it has been loaded from disk, or imported to a spare screen which has a different palette from that of the brush.

Before placing the imported brush on the screen, hold down the right mouse button and move down the Brush Menu until "Remap" is highlighted; then release the mouse button. The top bar of the Fast Menu will display the number of the current scanline being re-mapped, and the number remaining to be remapped. After the process is complete, the brush will reappear on the screen composed of its original colors.

FREE: (ALT - DELete from the keyboard)

This option will clear the memory buffer of the previously selected custom "pic-brush"; a brush, if attached to the crosshairs, will disappear as soon as this item is selected.

If a previously selected custom brush was being kept in memory, available for recall, it will be cleared and the memory will become available for other operations. Depending upon the size of the brush in question, quite a lot of memory can be freed this way.

Hold down the right mouse button and move down the Brush Menu until the word "Free" is highlighted; then release the button.

7 The Special Menu

The fourth choice on the Main Menu Bar will be the "Special" Menu, which contains a selection of specialized drawing functions. When you move your mouse pointer to the very top of the screen and press the right (Menu) button on your mouse the following options will appear beneath the Menu title, Special:

CYCLE DRAW: (TAB key from the keyboard)

The first option on the Special Menu is the Cycle Draw function. When this item has been selected, an "X" will appear within the small circle on its left. To de-select Cycle Draw, just repeat the selection process; it's a toggle. The default position is OFF.

This function will cycle through the Palette colors FROM your selected Foreground Color square TO your selected Background Color square, using the color squares in between the two. You'll notice that your selected Foreground Color square does not need to be located in a higher position (closer to color zero, which is the top left color square) than your chosen Background Color. If the Foreground Color is in a lower position than your Background Color, the cycling will take place in reverse; backing through the color squares toward the Background Color.

Most drawing operations will utilize color cycling. Continuous tools such as Free Draw, Dotted Free Draw, or Airbrush will cycle the colors as you draw; "one shot" tools such as Filled Circles, Rectangles or Ellipses will fill with each cycled color in succession as you continue to create a series of individual shapes. Cycle Draw works in conjunction with all drawing/painting modes in the Foreground and Background Mode Menus as well, from Blend to Xor.

When Cycle Draw is active (selected), a highlighted letter "C" will appear in the Fast Menu title bar.

➔ STENCIL:

This feature can be used to define an area of your painting which cannot be altered by any subsequent drawing or painting operation. It can be particularly helpful when using freehand tools adjacent to an area which you do not want to accidentally disturb. Once an area has been designated as a

Stencil, you need not be as accurate when you paint in a neighboring section.

When a Stencil is activated, a highlighted letter "S" will appear in the Fast Menu title bar.

As indicated by the arrow ahead of this selection, when you move your mouse pointer over the word Stencil, a sub-menu will appear containing the following options

I. ON/OFF: ("`" (the reversed apostrophe, or first single quote mark, located just below the ESCape key) from the keyboard)

This command will toggle your previously defined Stencil on and off. This is helpful if you want to paint within the stenciled area temporarily, and then re-activate the Stencil in the same area without having to define it all over again. Any changes you make within the previously defined area while the Stencil is turned off will be protected when the Stencil is toggled back on again.

The de-activated Stencil will remain in memory and available for re-activation as long as the memory it occupies is not needed for another function. If the necessary memory has been appropriated by the program the On/Off entry will be "ghosted" on the sub-menu, indicating that it cannot be selected.

II. DEFINE: (" ~ " (the little wavy line in the upper case position just below the ESCape key; known as the "tilde") from the keyboard)

This option allows you to draw a freehand outline around the area you want to protect with the Stenciling function.

When you select Define from the Stencil sub-menu your pointer's crosshairs will reappear on the screen with the abbreviation "STEN" extending beneath them. Hold down either mouse button while drawing a freehand outline around the area you want the Stencil to protect; when the outline is complete, release the mouse button and the Stencil will be activated (On).

III. INVERT: ("I" from the keyboard)

This option allows you to reverse the area protected by your previously defined

Stencil; the area outside the shape you defined will now be protected, and the area inside will not. This function operates as a toggle, so you can switch back and forth easily. When the Stencil is Inverted, an "X" will appear within the circle ahead of the word Invert on the sub-menu.

➔ GRID:

The Grid feature enables you to use a functional but invisible pattern of intersecting lines to restrict the placement of brushes, filled shapes and freehand drawn lines to precise locations. When the Grid is activated, all drawing functions are guided by its dimensions; precise, consistent patterns and alignments can then be easily maintained during the painting process. Once Grid is highlighted on the Special Menu, a sub-menu will appear, containing the following options:

I. ON/OFF: ("G" from the keyboard)

After you have defined (and therefore activated) a Grid pattern, this selection will operate as a toggle; enabling you to turn off the Grid and re-activate it later without having to redefine it. When the Grid is ON, a highlighted letter "G" will appear on the Fast Menu Title Bar.

II. DEFINE: (Shift —"G" from the keyboard)

This function allows you to define the size and offset of your Grid pattern by creating a hollow rectangle. The upper left hand corner of this rectangle will set a point from which the remainder of the Grid will be built, and the dimensions of this rectangle will define the distance between the points of the Grid pattern.

If you would like to set this first point precisely, activate your Coordinates (numbers indicating the position of your crosshairs in one pixel increments from the left side and top of the screen, respectively) by highlighting the Prefs Menu and selecting the option "Coordinates" before you Define your Grid.

After you select Grid/Define, your mouse crosshairs will reappear on the screen with the word "GRID" extending beneath them. Position the crosshairs where you want one of your Grid intersections to be located, hold down either

mouse button, and pull out the resulting hollow rectangle until it becomes the size of your intended Grid squares. When you release the mouse button, your Grid will be in effect, although it will be invisible. Notice the letter "G" on the Fast Menu title bar, indicating the presence of a defined Grid.

➔ SHADOW:

This feature is a special effect which automatically creates a shadow behind any drawn object; whether created using the various filled shape tools, or the freehand fill tool; you can also select a pic-brush or use any available Font. Once the Shadow function is in effect, each shape drawn is first rendered as a Shadow, using the background setup specified in the BgMode Menu; then the same shape is rendered again as a foreground object on top of the Shadow, according to its specified offset; using the Foreground Mode Setup specified in the FgMode Menu. If no custom FgMode Setup has been prepared, the foreground object will be rendered in the currently selected Foreground Color, or a pic-brush will be rendered just as it appeared when it was cut from the screen. If no BgMode Setup has been designated, the Shadow will simply appear in the currently selected Background Color. Please note that if you have selected "Blend" in your FgMode menu, the Shadow will probably be visible through the foreground shape. Because the Shadow can be rendered according to your BgMode Setup, any Mode and/or Source can be used. See Chapter 8: The Mode Menus for descriptions of these options.

Although Shadow will function with the Freehand Fill tool, it cannot work using Background or Boundary Fill because these two options fill a pre-existing shape or area.

When you highlight the Shadow option on the Special Menu, the following items appear on the Shadow sub-menu:

I. ON/OFF: ("W" from the keyboard)

This selection activates or de-activates the Shadow creation effect; acting as a toggle. If you select ON without first having set up your Shadow parameters you will automatically enter the Define process, below.

II. DEFINE: (Shift -"W" from the keyboard)

This selection allows you to specify the offset to be used between a foreground object you intend to create, and its resulting Shadow. After you select Define, your crosshairs will reappear on the screen with the abbreviation "SHDW" extending beneath them. Hold down either mouse button, and move your cross-hairs FROM the relative position of your intended foreground object TO the relative position of its eventual Shadow. This process is similar to the one used when specifying the offset for the Pantograph function. After you've finished, and released the same mouse button, you will have activated the Shadow function; a highlighted letter "W" will appear in the Fast Menu title bar. You can abort the process and define your Shadow all over again by pressing the other mouse button before you've finished.

If you select "Relative," (below) the distance defined by your offset will be automatically scaled to relate to the size of your foreground object.

III. RELATIVE:

After this option is selected, the amount of the Shadow's offset is automatically scaled to the size of the drawn foreground shape. This depends upon either: (1) the base size established using the Define Base Size option (below), or: (2) the program's default base size of 60 pixels wide by 50 pixels high. If this Relative option is not selected, the amount of the offset remains the same as you specified when you used the Define function, above, regardless of the size of the drawn object.

IV. DEFINE BASE SIZE:

This option is to be utilized in combination with the Relative mode (described above). This allows you to specify your own median base size for the scaling of the Shadow's offset distance according to the size of the drawn object. If this option is not utilized, and Relative has been selected, the default base size of 60 pixels wide by 50 pixels high will automatically take effect. Drawing an object larger than the Base Size will INcrease the length of the offset, and drawing an object smaller than the Base Size will DEcrease the length of the offset.

After you select this function by highlighting it and releasing your right mouse button, the crosshairs will reappear on the screen with the word "BASE"

extending underneath them. Hold down either mouse button and pull the crosshairs away from your point of origin until the resulting rectangle is the approximate size and shape of your intended mid-sized object; then release the button.

HINTS:

The Shadow effect is best accomplished by selecting the Subtract Mode in your Background Mode Menu (BgMode) and choosing a dark grey as your Background Color. The darker the grey selected, the lighter the resulting shadow will become. This is because the Subtract Mode subtracts the numerical value of the applied color from the numerical value of the color(s) underneath. If you investigate the numerical values of various colors, you'll learn that darker colors have lower numerical values. Pure white has a value of "F F F" (equivalent to "15 15 15" because the letters "A" through "F" substitute for the double digit numbers "10" through "15"), while absolute black carries a value of "0 0 0." Therefore, when the value of an applied dark grey (let's say "2 2 2") is subtracted from the value of the color(s) underneath, their Red Green and Blue values are each reduced by the number two, and they are evenly darkened to a slight degree. A lighter grey ("9 9 9") would reduce the R G B values of the underlying colors considerably, thus producing a very dark shadow.

When using Shadow in conjunction with the Text Tool and typing a series of letters, the shadows of successive letters may overlap. To overcome this problem, Shadow the text using the following procedure:

1. Type in the text without using Shadow
2. Pick up the line(s) of text as a Brush
3. Select a dark grey background color
4. Select Subtract Mode in the BgMode Menu
5. Activate Shadow by using Define to set your desired offset
6. Stamp the Brush into place.

This way your text will be treated as an integrated shape and no overlapping of shadows will occur.

8 The Mode Menus

Your fifth and sixth choices, on the far right of the Main Menu bar, will be your Foreground and Background drawing Mode Menus (FgMode and BgMode). These menus offer various "Modes" and "Sources" which can be selected independently to create separate foreground and background painting "Setups"; the entire combination of Mode, Source, and selected Color for either the foreground or the background will be referred to as the "Setup." The left mouse button paints with the Foreground Mode Setup, and the right mouse button uses the Background Mode Setup. This enables you to easily switch back and forth between two entirely different painting effects, just by pressing one or the other mouse button. Move the mouse pointer to the very top of the screen and hold down the right mouse button; then move your pointer until you see "FgMode" highlighted in lavender. The FgMode Menu will then open up underneath; because the selections on both the FgMode and BgMode Menus are exactly alike the following options will be found on each. They keyboard commands, however, will only invoke the FgMode Menu functions:

NORMAL: (first Function Key, F1, from the keyboard)

When the drawing mode selected is "Normal," all regular drawing functions of the program are unmodified. When this item is currently selected, an "X" will appear within the small circle to the left of the word "Normal" on the Menu.

BLEND: (second Function Key, F2, from the keyboard)

When the drawing mode selected is "Blend," the program will combine a "brush" with whatever happens to be underneath it when you click the left mouse button and set it onto the screen. This applies to both standard brushes and custom brushes, as well as any filled rectangle, circle, ellipse, free-hand fill or text.

The relative degree to which the background shows through the brush, or the brush dominates the background, can be determined by using the "Set" function:

I. SET: (ALT-"M" from the keyboard)

Just beneath the word "Blend" on the Mode Menus you'll find the word "Set..." Hold down the right mouse button, move down the menu until "Set..." is

highlighted; then release the mouse button. A requester will appear, with the words "Blending Ratio" in the title bar.

The black HORIZONTAL rectangle represents the blending ratio between the background and the brush, from left to right. The rectangle to its left contains a series of gradations from white to black. This grey scale gadget represents the stages of blending available if a solid white brush is placed over a solid black background.

The black VERTICAL rectangle represents the blending ratio between the background and the brush, from bottom to top. The rectangle above it contains a series of gradations from white to black. This grey scale gadget also represents the stages of blending available if a solid white brush is placed over a solid black background.

The default positions are half-way; producing an image which is 50% background (the portion of the painting behind the brush) and 50% brush.

There are three methods available for changing the default settings:

1. Using the Bi-directional Control: the medium-sized grey square between the Horizontal and Vertical rectangles is the Bi-directional Control.

Position the mouse pointer within the square, and click the left mouse button; the Vertical and Horizontal graphs will change to represent a ratio of brush to background in which the brush obscures the background 100% at the point in the square where you've clicked the mouse button; graduating to a 0% ratio at the edges. The middle square will also update to show the visual effect of the setting. You can achieve the opposite (inverse) effect by clicking with the right mouse button.

To relocate the center of this gradation of 100% to 0%, place the mouse pointer in a new location within the Bi-directional control square, and click the left button; you'll notice that the Horizontal and Vertical graphs again update their displays to represent the changed center position of the Bi-directional Control.

2. Drawing a free-hand representation of the ratio inside the Horizontal and/or Vertical rectangle.

Position the mouse pointer inside the rectangle who's setting you wish to change, hold down the left mouse button, and draw a new free-hand line or curve to replace the original straight line. You can alter this line wherever you wish just by holding down the left button and drawing again; the line will change accordingly.

If you'd prefer a straight-line transition between sections of the graph, hold down the right mouse button while drawing (instead of the left); a straight line will be drawn between your starting point and your ending point as soon as you release the button. You can insert a new segment anywhere along the graph line.

3. Using the grey scale gadgets. To select one of these settings, locate your mouse pointer over one of the stages of grey inside the rectangular gadget and click the left button.

The white line within the black rectangle will adjust its position to visually represent the ratio of blending you have selected, and the large square in the center of the display will change its appearance to symbolize the outcome of the newly selected blending ratio.

I. SWAP AND COPY GADGETS:

In between the two graphs is an arrow pointing in both directions; this is the Swap Gadget. Click the left mouse button inside this symbol to switch the settings of the graphs.

Beneath the Vertical graph, and to the right of the Horizontal graph, are arrows pointing toward each graph, respectively. Click the left mouse button inside these symbols to copy the setting of one graph into the other.

II. IGNORE GADGETS:

Beneath each graph is a rectangle containing the word "IGNORE"; when this gadget is selected using the left mouse button, it will be highlighted.

Each one causes one of the graphs to be ignored, so it will not be considered in the Blend calculation. This fact will be demonstrated in the sample blending of the center square, and the white graph line will become grey in the "ignored" graph.

III. DITHER:

The Dither Control is a horizontal black bar at the top of the window; having the numeral "0" on the left. A small grey square appears in the left end of the bar. This is the default setting.

If you place the mouse pointer over the grey square and hold down the left button, you can slide the square along the bar, which will change the numeral from "0" to "15." These numbers represent the degree of dithering which will be used to graduate the colors of the brush from 100% to 0%.

After you've reset the dither control, the Bi-Directional control square will change to show the effect of the dithering on the existing settings.

IV. BACKGOUND AND GRADIENT:

On the top left side of the Blend requester are the gadgets, "BAK" and "GRD." When the Background gadget (BAK) is selected (default), the blending process behaves as described above: The Foreground Color is blended over the Background Color to the degree and pattern set in the requester.

When the Gradient gadget (GRD) is selected, any filled shape will be rendered with a spread of colors calculated between the Foreground Color and the Background Color. All of the features of the Blend requester can be used to determine the direction and appearance of the gradient. In this case, the color white indicated on the Blend requester will represent the color you use to paint your filled shape. If you paint with the Foreground Color using the left mouse button, the color white represents the Foreground Color, and black represents the Background Color; whereas if you paint with the Background Color using the right mouse button, the color white will represent the Background Color, while black will represent the Foreground Color; the shades of grey in between represent the various hues calculated between the two.

When selected, these gadgets appear white with black lettering.

V. CURVE:

Just below the BAK and GRD gadgets on the left side of the Blend requester is the Curve gadget (CRV). When this item is selected (default) the Bi-

directional Control and the Horizontal and Vertical Graphs will update to show a graduated curve in both directions. If you would prefer a pyramid effect, with straight lines converging in both the horizontal and vertical directions, and the color spread evenly calculated in a straight, linear progression, DE-select this gadget (turning it OFF) by positioning your pointer inside it and clicking the left mouse button; it will then appear black with white lettering.

When selected, this Gadget appears white with black lettering.

VI. AVERAGE AND MINIMUM:

Left of the two graphs are two gadgets, "AVG" and "MIN". When the Average gadget is selected, an average is taken from the settings of the related points from each graph, and the brush to background ratio is set at this average. When Minimum is selected, the point having the lower value will be used.

Using the Bi-directional Control, with the Minimum gadget selected, will have the effect of smoothly blending the edges of the brush with the background.

A Blend setting performed for EITHER the FgMode OR the BgMode will be in effect for BOTH the Foreground and the Background mode setups if Blend has been activated. The most recent setting in either Mode Menu will take effect in both Mode Menus. Automatic activation of the Blend Mode after having specified your settings will take effect ONLY within the Mode Menu in which the operation was done; you will not have inadvertently activated Blend in both your Foreground and Background Setups, but only in the Setup for which you intended. If you want to use a different setting for the other Mode Menu, you will have to select Blend/Set from within that other Mode Menu. The program does not maintain separate Blend settings for each. When you have completed your setting process, click the left mouse button inside the "OK" gadget to return to the painting screen; if you decide not to use the new settings, click "CANCEL," and the previous settings will be used.

ADD: (third Function Key, F3, from the keyboard)

This option adds the current color(s) of the brush to the background color(s).

Each color in the palette has a numerical equivalent which indicates the levels of Red Green and Blue which combine to make up any one of the 4096

possible colors. There are a total of 16 possible levels for each of the three RGB values, ranging from "0" to "F." The letters "A" through "F" are substituted for the double digit numbers "10" through "15"; therefore, a color having a numerical value of "1 5 A" would be a combination of the first level of Red, the fifth level of Green, and the tenth level of Blue. Zero "0" indicates no level at all; the color indicated is not present in the combination; therefore "0 0 0" is absolute black. Because we are dealing with light, the highest level of all three RGB values, "F F F," is pure white; the maximum presence of all colors. When you ADD the value of an applied Foreground Color to the value(s) of the underlying color(s) the result will always be brighter; closer to white, because the combined values have resulted in an increased overall value. Continue down the mode menu while holding down the right mouse button until the word "Add" is high-lighted; then release the button. The word "ADD" will appear in the drag bar of the Fast Menu.

SUBTRACT: (fourth Function Key, F4, from the keyboard)

This option subtracts the current color(s) of the brush from the Background Color(s).

Each color in the palette has a numerical equivalent which indicates the levels of Red Green and Blue which combine to make up any one of the 4096 possible colors; please see ADD, above, for the more complete explanation. "0 0 0" is absolute black. Because we are dealing with light, the highest level of all three RGB values, "F F F," is pure white; the maximum presence of all colors. When you SUBTRACT the value of an applied foreground color from the value(s) of the underlying color(s) the result will always be darker; closer to black, because the subtraction of the values of the foreground color has resulted in a decreased overall value. Continue down the mode menu while holding down the right mouse button until the word "Subtract" is highlighted; then release the button. The "SUB" will appear in the drag bar of the Fast Menu.

MAXIMUM: (fifth Function Key, F5, from the keyboard)

This function compares the separate Red, Green and Blue (RGB) values of the color(s) you are applying to the screen with the RGB values of the color(s)

underneath, pixel by pixel. If the color of the applied pixel has any RGB values which are higher than those of the underlying pixel, the Red, Green and/or Blue value(s) of the underlying pixel will be modified to the higher value(s). If the underlying pixel contains any RGB values which are already higher than those of the applied pixel, these values will remain unchanged.

MINIMUM: (sixth Function Key, F6, from the keyboard)

This function compares the separate Red, Green and Blue (RGB) values of the color(s) you are applying to the screen with the RGB values of the color(s) underneath, pixel by pixel. If the color of the applied pixel has any RGB values which are lower than those of the underlying pixel, the Red, Green and/or Blue value(s) of the underlying pixel will be modified to the lower value(s). If the underlying pixel contains any RGB values which are already lower than those of the applied pixel, these values will remain unchanged.

USE H: (seventh Function Key, F7, from the keyboard)

This function matches only the Hue of an applied color; maintaining the existing Saturation and Value of the underlying pixels. The Hue of any underlying pixels will be replaced with the Hue of the applied color. This is useful for altering only the colors in an existing picture, while retaining the original characteristics of brightness and saturation.

Note that this is not the function designed for colorizing black and white pictures, or making color pictures black and white, because the Saturation and Value are not altered. The more white in the color the lower its Saturation; very un-saturated colors are pale pastels; almost white. The more black in the color the lower its Value; colors with a very low Value are almost black. A pure white will not accept any degree of color because its Saturation component is zero; there must be some degree of Saturation for any amount of color to be apparent, and since the Saturation value will not be replaced during this operation, none of the white areas can be colorized. If your pre-existing color happens to be a pale shade of grey, or a pastel, you will be able to alter it to the Hue of the applied color because a measurable amount of Saturation is present.

USE H & S: (ninth Function Key, F9, from the keyboard)

This function matches both the Hue and Saturation of an applied color; maintaining the existing Value of the underlying pixels. Since the Hue and Saturation of any underlying pixels will be replaced with those of the applied color you will be able to colorize white areas. This is useful for colorizing black and white pictures or making color pictures black and white because it will input the applied color (Hue) and its degree of Saturation without changing the Values (presence of grey to black) in the original picture.

AND, OR AND XOR:

These functions will apply certain logic operations between every pixel drawn and the background pixel. These logic operations utilize the numerical equivalents of the Red, Green and Blue (RGB) components of each color in binary form (base two), and compare the binary value of the foreground pixel to the binary value of the background pixel. The result will become the binary numerical equivalent of a third color which you will then see on the screen. Each of the logic operations are described below; you'll see that they are each a certain type of "gate" or "mask."

I. AND: (Shift-F1, from the keyboard)

The And operation compares the binary RGB value of the foreground pixel to the binary RGB value of the background pixel, with the condition that a value of "1" compared to another value of "1" will remain "1," but a value of "1" compared to a value of "0" will become "0." One AND one equals one, but a zero cancels out a one.

Example:
```
  0011
+1010
------
  0010
```

II. OR: (Shift-F2, from the keyboard)

The Or operation compares the binary RGB value of the foreground pixel to the binary RGB value of the background pixel, with the condition that if either

value is equal to "1" the result is "1." One OR one equals one. All the one bits come through; nothing is canceled out.

Example:
```
  0011
+1010
 1011
```

III. XOR: (Shift-F3, from the keyboard)

The Xor (known as "Exclusive Or") operation compares the binary RGB value of the foreground pixel to the binary RGB value of the background pixel, with the condition that if either value is equal to "1" the result is "1," but if both values equal "1" the result is "0." One OR one equals one, but one AND one EXCLUDES one; the one bits in both colors cancel each other.

Example:
```
  0011
+1010
 1001
```

The name of any Foreground drawing mode other than "Normal" will appear inside the drag bar when it has been selected. To de-select any drawing mode, simply select one of the alternatives. The currently selected mode will also show an "X" in the small circle to its left in the Mode Menu.

SOURCE:

Below the list of Drawing Mode Functions on the FgMode and BgMode Menus is a list of Drawing Sources. The word "Source" is not a selectable item in itself, but is the subject of the list below it. "Source" refers to the origin of the pixels which will be used to perform the current drawing operation, and your currently selected Source will be indicated by the presence of an "X" within the small circle ahead of its name. Remember that your drawing Source will be affected by any variations in drawing Mode you have selected above. The following Sources are available:

I. COLOR: (Shift-F4, from the keyboard)

This is your normal drawing source, and is the default selection. Your currently selected Foreground and Background Colors will be used when this item is selected.

II. PATTERN: (Shift-F5, from the keyboard)

This selection will enable you to use your currently displayed (active) or last "pic-brush" (in memory) as the basis for a repeating pattern, with which you can draw and paint.

This option will require another 1.3 times the memory than what is necessary to maintain the brush itself, and will force the program to keep the current pic brush even when available memory runs low and the "Keep Brush" option in the Prefs Menu is not selected. Therefore, if an operation is attempted when there is insufficient memory available, the operation will not be completed, but the pic-brush will not be lost.

A Pattern set up within EITHER the FgMode OR within the BgMode will be in effect for BOTH the Foreground and the Background mode setups if a Pattern has been activated. The most recent Pattern set in either Mode Menu will take effect in both Mode Menus. Automatic activation of the Pattern after having specified your settings will take effect ONLY within the Mode Menu in which the operation was done; you will not have inadvertently activated a Pattern in both your Foreground and Background Setups, but only in the Setup for which you intended. If you want to use a different Pattern for the other Mode Menu, you will have to select Pattern from within that other Mode Menu. The program does not maintain separate Pattern settings for each.

III. PANTO: (Shift-F6, from the keyboard)

This option affords you the use of a computerized Pantograph: the mechanical drawing tool which enables you to trace a drawing in one location while reproducing it in another.

The source location is directly connected to the designated drawing location so that every area which is traced is reproduced accurately. This is useful when you need to reproduce an area in a painting which is too subtle and/or complex to be conveniently copied as a brush; also for erasing unwanted elements in a digitized picture by replacing them with adjacent colors or with the background texture.

The first time you select PANTO from either the FgMode or BgMode Menu, your mouse pointer's crosshairs will reappear on the screen with the abbreviation "PANT" extending beneath them. You now need to "Set" the offset position for your pantograph; the instructions for doing so follow under "Set," below.

When you want to exit PANTO mode, just select another drawing mode from within the Mode Menu in which you last selected PANTO.

SET: (ALT-"P" from the keyboard)

The first time you select Panto from either the FgMode or BgMode Menu, you will automatically enter the setting process; from that point on, until you quit the PHOTON PAINT program and begin another time, you will need to directly select Set whenever you want to reposition the offset for that particular Mode Menu. If you select Panto or Set from the OTHER Mode Menu, the setting you perform there will supercede any setting performed for the previous menu; the program will keep your most recent Panto offset in memory, but not a separate one for each Mode Menu.

After selecting Set from either Mode Menu, the crosshairs will reappear on the screen with the abbreviation "PANT" extending beneath them. Hold down either mouse button and pull out the straight line FROM your intended painting location TO your intended source location; release the mouse button. Two sets of crosshairs will now appear when you move the mouse; the larger set indicate your painting location, and the smaller set indicate the source of the pixels to be copied into that painting location. Move the larger set of crosshairs into the area where you wish to paint, hold down the left mouse button (or right mouse button if using the Pantograph as a background mode setting) and move the crosshairs. You'll begin to see pixels appearing from the source location. You may want to select a larger standard brush from the Fast Menu's Toolbox in order to make copying easier for the innermost areas of the painting location; then reselect the small brush when you reach the outer areas and want the edges to blend subtly.

If you select an alternate drawing mode from the same Mode Menu, you can recall the previously prescribed Panto setting by simply reselecting Panto; if

you want to change the offset from that same menu, select Set. Remember, the program maintains one pantograph setting at a time, and that will be for whichever Mode Menu it was last set. If you have set a Panto offset in the FgMode Menu, and you want to paint with your Background Color using the right mouse button, just do so. The smaller set of crosshairs will disappear from the screen.

IV. UNDER: (Shift-F7, from the keyboard)

This option allows you to perform a "rub through" operation from the next alternate page to the current page.

Pixels from the next page will appear on the current screen in the area you paint when you hold down the appropriate mouse button. If you have selected Under from only the FgMode Menu, the rub through will take place when the left mouse button is held down, and if Under was selected as a BgMode, the effect will only take place when holding down the right mouse button. You may activate Under for both the Foreground and Background Modes if you wish to use it with both Setups. The name of any Foreground drawing Source other than "Color" will appear inside the drag bar when it has been selected. To de-select any drawing Source, simply select one of the alternatives. The currently selected Source will also show an "X" in the small circle to its left in the Source section of the Mode Menu.

9 Tutorials

The following tutorials are designed to demonstrate some creative methods of combining the various features of PHOTON PAINT. They are designed to be explicit enough for a relative beginner to follow without having had to read the entire manual beforehand.

BLENDING A BRUSH:

Using the Blend function to place a custom "pic-brush" into a pre-existing painting.

In this example we will practice:

loading a picture from disk;
loading a brush from disk;
using a second screen;
setting the foreground blending ratio for the brush;
placing the brush into a pre-existing painting.

1. First, load the picture entitled "Floor.pic" from the Art and Tutorial disk. If you have a second disk drive you can place this disk in df1:.

   Move your mouse pointer to the very top of the screen and hold down the right (as opposed to left) mouse button; the Main Menu will appear. At the far left you'll see the word "Project"; move the pointer over this word, and it will be highlighted in lavender. The Project Menu will appear underneath; now move your pointer down to the second word on the menu, "Load..." When this word is highlighted, release the right mouse button, and a requester will appear which reads "Load Picture" at the top.

   Right under this phrase is a black bar labeled "Drawer"; a "drawer" is the name of a directory in which paintings ("pictures"), have been saved. The name of such a directory must be entered into this black bar prior to attempting to load a picture from the Art disk.

   The program will automatically search the program disk, which is in df0:, and list its directories, the names of which will all appear in the large, dark grey rectangle in the center of the requester. The sample pictures which have been included with the program are on the second disk, labeled "Photon Art

Disk." Place this disk in your second disk drive (df1:), and move your mouse pointer into the gadget under the Drawer bar which reads "df1:"; then click the left mouse button. The program will read the disk in df1: and list its directories in the large grey area of the requester.

Now move your mouse pointer over the (dir) PICTURES, and click the left mouse button. The name of the "PICTURES" (dir) will appear in the "String gadget" labeled "Drawer," preceded by the name of the disk drive on which it is located (df1:). A String gadget is an area in which you can enter data.

The titles of all pictures stored in the Pictures directory will appear in the large, dark grey rectangle. Select the one entitled "Floor.pic" by placing your mouse pointer over it's title, and clicking the left button. Notice that the name of the selected title now appears in the black bar labeled "File" near the bottom of the requester. Now, click the left mouse button while the pointer is in the gadget which reads, "LOAD"; the requester will disappear, and the selected picture file will begin to fill the screen. It will appear normal after the second stage of the display process is complete.

2. Switch to an "alternate" screen by pressing "K" on the keyboard, or by moving the pointer up to the top of the screen, holding down the right mouse button to reveal the Main Menu, finding the word "Project" on the left side, moving down the Project Menu to "Alternate," moving to the sub-menu which will appear, and releasing the right button while highlighting the words "Next Page." We'll use the alternate screen to call up a diaphanous figure who will be placed in the mysterious setting we brought up on the first screen.
3. Move your mouse pointer to the very top of the screen, hold down the right button, and move over to the word "Brush," highlighting it in lavender; move down the Brush Menu to the word, "Load..." and release the right mouse button. A requester will appear which is just like the "Load" requester on the Project menu, except that the title at the top will read, "Load Brush." A drawer entitled "BRUSHES" is included on the Art disk, preceded by "(dir)" to indicate that this is a directory ("drawer" is synonymous with "directory" in the Amiga operating system). Select this directory by locating your pointer over the words "(dir) BRUSHES" in the large grey requester, and clicking the left mouse button.

Find the title, "Ghost.bsh"; place the mouse pointer over its name, and click the left button; the name will appear in the black bar labeled "File," and when you click the left mouse button in the gadget which reads, "Load", the requester will disappear, and the brush will soon appear on the screen. When the brush appears, it will be attached to the mouse pointer; not fixed on the screen.

4. Now make sure the background color of the brush will be transparent. To select this item, hold down the right mouse button and move your mouse pointer down the Brush Menu until the word "Trans" is highlighted; then release the button. You can also select by clicking the left mouse button while you're holding down the right mouse button and the word "Trans" is highlighted. An "X" will appear in the small circle to the left of the word, and the item will remain selected until de-selected using the same procedure. This function can be performed from the keyboard by holding down either of the "ALT" keys, and typing "R."
5. Return to the first screen by pressing "J" on the key board, or by moving down the Project Menu to "Alternate," and releasing the button while highlighting the words "Previous Page." The "alternate" screen(s) is/are always the one(s) that you are not seeing at the moment.
6. Now you need to change the foreground drawing mode to "Blend," so the brush can be set into the painting at a percentage, and our "Ghost"will look diaphanous. When the drawing mode selectedis "Blend," the program will combine a brush with whatever happens to be underneath it when you click the left mouse button and set it onto the screen. The relative degree to which the background shows through the brush, or the brush dominates the background, can be determined by using the "Set" window:

   Just beneath the word "Blend" on the FgMode Menu will be the word "Set...". Still holding down the right mouse button, move down the menu until "Set" is highlighted; then release the mouse button. A requester will appear, with the words "Blending Ratio" in the title bar.

   The large HORIZONTAL rectangle represents the blending ratio between the background and the brush, from left to right. You can see a rectangle containing various shades of grey from white to black on the left side of this rectangle.

The large VERTICAL rectangle represents the blending ratio between the background and the brush, from bottom to top. You'll also see a rectangle containing various shades of grey above this rectangle.

These Grey Scale Gadgets symbolize the degree of blending, imagining a solid white brush over a solid black background; indicating the relative percentage of each using shades of grey.

The default positions are half-way; producing an image which is 50% background, and 50% brush.

Position the mouse pointer inside the grey scale gadget to the left of the Horizontal graph, and click the left button just above half (toward white). This will create a straight line representing the selected ratio all the way across the graph. Do the same at the Vertical graph.

Next, position the mouse pointer over the small grey square inside the black bar labeled "Dither"; hold down the left button and drag the grey square to the right until the numeral to the left of the bar reads "4." When you have completed your setting process, click the left mouse button inside the "OK" gadget to return to the painting screen.

7. Position the ghost where the blending will be interesting, i.e., where a torch stand will show through, and part of the floor. Click the left mouse button to set the brush into the picture.

   If you are unhappy with the outcome, select "UNDO" by placing the pointer inside the little grey square in the top right of the drawing tools section of the Fast Menu, and clicking the left mouse button; or by typing "U" from the keyboard. This must be done before you do anything else; it can only undo the most recent action.

   You can experiment with the various settings described above until you are pleased with the appearance of the ghost in the painting.

8. Save the completed painting if you like. For the sake of brevity, I have described the saving process at the very end of this chapter.

USING PERSPECTIVE:

1. First, load the picture entitled "Floor.pic" from the Art disk in df1:. The procedure is the same as described in the tutorial above.
2. Move the Fast Menu to the bottom of the screen by placing the mouse pointer inside the drag bar,holding down the left button, and dragging the window as far down as it will go.
3. Select the Scissors Tool from the tools section of the Fast Menu. Place the pointer inside the grey square with the picture of the scissors in it, and click the left button ONCE. When you return to the painting area, a set of perpendicular lines will appear, intersecting in the center of the crosshairs.

   Now we'll pick up the three torches as a brush:

   Place the intersection of the perpendicular lines at the upper left corner of an imaginary rectangle framing the three torches; then hold down the right mouse button and pull the resulting box open until it frames the three torches; bases and all. Release the button. In a moment, the torches will disappear from their former location, and reappear attached to the crosshairs. You may notice some abnormal looking streaking of the image; never fear, this results from the HAM display protocol, and will be corrected when the brush is set back into the painting.

   Move the pointer back to the Main Menu bar, hold down the right button to reveal the names of the various menus, go to the Brush Menu, and select "Trans" to be certain that the background of the brush will be transparent.
4. Place your mouse pointer in the Drag Bar of the Fast Menu, and hold down the left button to drag it back up to the very top of the screen. Notice that as soon as you move the mouse crosshairs into the Fast Menu, they become the shape of an arrow again, and the brush disappears. When you return to the painting area, your brush will reappear, along with the crosshairs.
5. Move your brush into the center of the floor area in front of the two large columns.
6. Select "Tilt" from the keyboard by holding down an "ALT" key and pressing "T." This way you do not move the brush by taking the crosshairs to the top of the

screen in order to access the Brush Menu from the Main Menu bar. The word "Tilt" will appear under the crosshairs.

7. We're going to create two rows of torches in perspective; one on each side of the area between the two large columns. The rows of torches should appear to be on each side of an aisle, and you are looking directly down the center.

   When you hold down the left mouse button, a hollow rectangle will appear in place of the brush, representing its dimensions. In the Drag Bar of the Fast Menu, you'll see three "0"'s, and the words "Pitch" and "Roll" to their right.

   First, "Roll" one side of the brush so that the rectangle appears to be in perspective, one side becoming smaller in the distance. To do this conveniently, lock the pitch capability by pressing the number "7" on the numeric keypad (which is on the right side of your keyboard). The word "Pitch" will appear white on a black background to indicate that it is locked.

   I rolled the left side away from me, so that the center numeral (representing the degree of roll) read "-66." Hold down the left mouse button and move the crosshairs to the left until the center numeral reads "-66." Now lock the "Roll" capability by pressing the number "8" on the numeric keypad, and re-enable the "Pitch" capability by toggling the number "7" again. "Roll" should appear white on a black background, and "Pitch" should appear normal.

   Hold down the left mouse button and move the crosshairs down until the numeral on the left reads "25." The bottom line of the rectangle should be about the same angle as the floor of the painting.

8. Press the space bar to draw the brush in perspective. On the Drag Bar you'll see the program counting the number of scanlines remaining to be computed before the new brush is displayed.

9. Position the brush so that the base of the torch nearest you is lined up with the near left corner of the base of the column on the right. Then click the left mouse button to set it in place.

10. Next, move the crosshairs to the very top of the screen, hold down the right button, move over tothe Brush Menu and then down to select "Flip"; then "Horiz" from the sub-menu. The brush will be recalculated, and you'll have the row of torches for the opposite side of the aisle.

11. Locate the new brush directly across from the one on the right, so that you have a mirror image; then click the left mouse button to set it into place. You should now have two rows of torches in perspective. True...the torches do look flat, but the next tutorial should teach you how to create more 3-dimensional looking objects!

3-D SURFACE MAPPING:

Wrapping a patterned surface on a series of 3-dimensional shapes.

In this example we will learn to wrap a brush around:

a tube;
a cone;
a ball;
a cube;
each separate side of a cube;
an ellipse;
an asymmetrical free-hand drawn shape.

1. First, load the picture file entitled "Demo4.pic." Follow the procedure you learned in the previous tutorials.
2. Next, grab the patterned square in the lower right side of the picture as a brush, the way you learned earlier. Use the left mouse button to pick up a copy of the square as a brush, without making it disappear from the screen (using the right mouse button to pick up a brush will lift it off the screen entirely, leaving the only copy attached to the crosshairs as a brush).
3. Now, move the crosshairs to the very top of the screen and hold down the right mouse button; this will reveal the Main Menu. Go to the word "Brush," highlighting it in lavender; the Brush Menu will appear below. Move down to the option "Wrap on"; the sub-menu will appear; select the first choice, "Tube," by highlighting it, then releasing the mouse button.

   The brush will appear with the word "Tube" extending under the crosshairs. Hold down the left mouse button; a hollow rectangle will appear, having the same dimensions as the brush. Now, still holding down the left button, move the crosshairs toward the center of the brush. You are determining the width

of the resulting tube. Make the tube no wider than half the size of the brush, or the effect of the wrap will not be very discernible; release the mouse button to begin the wrapping process. In a few moments, the brush will reappear as a 3-D tube, wrapped with the festive holiday paper.

If you would like to collect and compare the various 3-D shapes after you've wrapped the brush around them, switch to the spare screen by selecting "Alternate," and then "Next page" from the Project Menu, or by typing "K" from the keyboard. When the spare screen appears, locate the tubular version of the brush to one side of the screen (leaving room for several other shapes, soon to be created), and click the left button to stamp it into place. Then repeat the process to switch back to the original screen, but select "Previous Page" from the "Alternate" sub-menu, or type "J" from the keyboard. The "alternate" screen(s) is/are always the one(s) you are not seeing at the moment.

4. Repeat the above process, selecting "Cone" from the sub-menu in the "Wrap On" option of the Brush Menu. Remember to pick up your brush using the left mouse button, so the original square of holiday paper will remain in the painting for further exercises.

   When you hold down the left mouse button, a hollow triangle will appear. You can move the mouse toward the center of the brush to narrow the base of the triangle, but if you release the mouse button while the base is as big as the bottom of the brush, you will be able to see a more dramatic effect when the wrapping process is complete.

   Use the alternate screen to add the cone shaped version of the brush to the collection.

5. Pick up your brush again, using the left mouse button; then repeat the above process, selecting "BALL" from the sub-menu in the "Wrap On" option of the Brush Menu. When the brush reappears, the crosshairs will be in the center, with the word "BALL" extending underneath.

   When you hold down the left mouse button no hollow circle will appear until you pull the crosshairs outward from the center of the brush; then you can widen the circle until it reaches one of the dimensions of the rectangular

brush. The circle will automatically stop growing before it would have become too large. Release the mouse button to begin the wrapping process.

The ornament you see in the upper left was created by the artist who painted this example, by wrapping the brush design around a ball, just as you are doing.

Now add the ball shaped brush to the collection on the alternate screen.

6. Pick up the brush again with the left button, and select "Ellipse" from the "Wrap On" sub-menu.

   The crosshairs will appear in the center of the brush, and, as with the ball function, no hollow shape will appear until you pull outward while holding down the left button. You can create either a vertical ellipse (by pulling predominantly upward), or an horizontal ellipse (pulling outward). Once an edge of the brush is encountered, the ellipse will stop growing in that direction. You can still enlarge the ellipse in the other direction, until you reach that edge. This particular design would probably look most interesting on an horizontal ellipse, but you can do one of each, if you wish, and compare! Release the button to begin the wrapping process.

   Use the alternate screen to add this brush to your collection.

7. Next, pick up your brush again, and select "Free." The brush will reappear with the crosshairs in the middle. When you click the left mouse button and then move the pointer, a hollow rectangle the size of the brush will appear, and the crosshairs will be in the center of the rectangle.

   Move the crosshairs around within the rectangle without holding down the left button. Position them wherever you would like to begin drawing your free hand shape; then hold down the left button, and begin drawing. When you use the left mouse button, a symmetrical free-hand shape will automatically be created; a mirror image of what you are drawing on either side will be duplicated on the other side.

   If you would rather draw an asymmetrical free-hand shape, just hold down the right mouse button while you're making your outline; the line will only appear on the side in which you are doing your drawing, and you can create two different sides for your shape.

Wherever you happen to draw in the rectangle, the line will appear, and replace any line you may already have drawn in that area; therefore, you do not need to erase if you wish to change a portion of the profile you are drawing. Just redraw in whatever area you wish until the shape pleases you; then press the space bar on the keyboard to begin the wrapping process. This particular feature is so much fun, you may want to try several different free shapes, and add them to your alternate screen.

8. Next, pick up your brush with the left mouse button again, and select "Cube 3/4." The brush will reappear with the crosshairs in the center, and "CUBE" written vertically underneath. Hold down the left mouse button, and the hollow outline of a cube in perspective will appear with in the dimensions of the brush; move the mouse to alter the perspective of the cube until you are pleased; then release the button to start the wrapping process.

   Again, add this new shape to your collection on the alternate screen (unless you've stuffed it to capacity with a collection of free-hand shapes!).

9. Finally, pick up your brush again, and select "Cube * 3." The brush will reappear with the crosshairs in the center, and the word "CUBE" written underneath, just as before; but this time, when you hold down the left mouse button, a cube will appear which is large enough to hold a full reproduction of the brush on each of its three sides. Move the mouse until the perspective of the cube pleases you, then release the button to start the wrapping process. The final cube will show a full image of the brush, in perspective, on all three exposed sides.

   Copy this last example to your alternate screen, and if you wish to save your collection of 3-D wrapped shapes, follow the procedure for saving your work which is described at the end of this chapter.

THE BALLOON TUTORIAL:

Creating a painting of a 3-D hot air balloon with basket, floating in a sky filled with translucent clouds.

In this example we will practice:

grabbing a brush from the screen;
using an alternate screen;
rotating a brush 90 degrees;
resizing and reversing the brush;
using the blend settings to provide a variable transparency of the entire brush;
placing the brush into the painting in each of these different forms.

Then:

grabbing another brush from the screen;
assigning the colors used in the brush to the color registers;
using the "transparent" option in the Brush Menu to make the Background Color of the brush invisible when placed in the spare screen;
setting the "Luminosity" of the brush;
mapping the brush around a 3-D object;
using the line tool.

1. Move your mouse pointer up to the Main Menu, hold down the right mouse button, highlight the word "Project," move down the Project Menu until the word "Load..." is highlighted; then release the mouse button. The Load window will appear.
2. Load the picture entitled "Balloon.pic" by finding its name in the large grey requester, moving your mouse pointer over the name, clicking the left mouse button (the name should then appear inside the black bar labeled "File"); then placing the mouse pointer inside the rectangle which reads "LOAD," and clicking the left mouse button. The window will disappear, and the picture should fill the screen in a moment or two.
3. Make the Background Color of the brush you're going to pick up transparent:

   First, identify the Background Color of the present screen. Place the mouse pointer inside the large, vertically divided square (containing two different colors) to the right of the small colored squares; then click the left mouse button. This will allow you to pick a color on the screen which you designate as the Background Color. Move the pointer back to the screen; the word

"PICK" should appear beneath the crosshairs. Now, place the crosshairs within the Background Color of the screen (sky blue), and click the right mouse button. The right mouse button is always used to select the Background Color (the left is used to select the Foreground Color). The newly selected Background Color will appear in the right side of the vertically divided square (the current Foreground Color appears on the left side).

Second, make sure the designated Background Color will be transparent when you pick up a "brush." Hold down an "ALT" key while typing "R" from the keyboard, or move the crosshairs to the very top of the screen, hold down the right mouse button to reveal the Main Menu, move the pointer to the word "Brush"; then down to the syllable "Trans" and click the left button (or release the right button) while the word "Trans" is highlighted.

4. Move your pointer into the square showing the Scissors Tool, click the left mouse button, and move back onto the painting area. Now, position the perpendicular lines at one corner of the vertical cloud on the right side of the screen; hold down the left mouse button, and pull out the resulting box outline until it surrounds the cloud; then release the mouse button. A copy of the cloud will now be attached to your mouse's crosshairs.
5. Switch to the next (alternate) screen by pressing "K" on the keyboard, or by moving the pointer up to the top of the screen, holding down the right mouse button to reveal the Main Menu, finding the word "Project" on the left side, moving down the Project Menu to "Alternate," moving to the sub-menu which will appear, and releasing the right button while highlighting the words "Next Page." We'll use the alternate screen to paint the sky filled with clouds.
6. Move your mouse pointer to the color palette and select an appropriate shade of blue for the sky by clicking the right mouse button while your pointer is inside the chosen color square. The right mouse button is always used to select the Background Color. The new Background Color will appear in the right-hand side of the vertically divided square to the right of the small color palette squares. The small square containing the color you chose will be framed in black and white. The Foreground Color is always framed in solid white, and is chosen by clicking the left mouse button while the pointer is located in the color square.

7. Your cloud will still be attached to your crosshairs. Now clear the screen (which will fill it with the currently selected Background Color of sky blue) by pressing the "DEL" key on the keyboard, or by holding down the right mouse button to reveal the Main Menu, finding the word "Project" on the left side, moving down the Project Menu to the first word, "Clear," and releasing the right button while the word is highlighted. A requester will appear, asking you if you really want to clear the screen. Place the pointer in side the "OK" gadget and click the left button.
8. You may have to "remap" the colors of the brush, if they have been altered by moving from the original screen to a new one with a different palette. Move the crosshairs to the very top of the screen, hold down the right mouse button to reveal the Main Menu, move over to highlight the word "Brush," then down the Brush Menu to the word "Remap" and release the button. The program will take a few moments to recalculate; then the brush will reappear in its original color scheme.
9. Next, you need to rotate the cloud 90 degrees because we stored it on the work screen sideways! Decide which way you think the cloud would look best (of course, you can rotate it each way eventually for variety). +90 degrees will rotate it clockwise, and -90 degrees will rotate it counter-clockwise.

   Hold down the right mouse button and move down the Brush Menu to "➔ Rotate"; then examine the sub-menu which will appear. Choose either +90 or -90 from the sub-menu by releasing the mouse button while the item is highlighted. The program will take a minute to recompute the brush; then it will reappear in its horizontal form.
10. Now we'll make the cloud-brush appear translucent; partially blended with the sky when you set it into the painting. Move the crosshairs up to the very top of the screen and hold down the right mouse button; then move the pointer to the word "FgMode," and down past "Normal" (which should be the default setting, and have an "X" in the little circle to its left) to "Blend." Still holding down the right mouse button, click the left button while the word "Blend" is highlighted in lavender; the "X" will move from "Normal" to "Blend." Now move down to the word "Set..." and when it is highlighted, release the right mouse button. A requester entitled "Blending Ratio" will appear.

Move the mouse pointer to the Grey Scale Gadget on the left of the black rectangle labeled "Horizontal," and position it just below the pure white area at the top of the gadget (about 80%); then click the left mouse button. The horizontal white line will move to the new setting.

Do the same with the black rectangle labeled "Vertical."

Find the black bar labeled "Dither"; place the mouse pointer over the small grey square inside the bar, and hold down the left mouse button while moving the pointer all the way to the right along the bar. The grey square will move with the pointer, and the digits to the left of the bar should read "15." This maximum amount of dithering will make the clouds look fleecy.

Now move the mouse pointer into the "OK" gadget on the bottom left of the window, and click the left mouse button; the window will disappear, and you'll be returned to the painting screen. The cloud will remain attached to the crosshairs.

11. Position the cloud on the screen wherever you wish, and click the left mouse button. The translucent, dithered cloud will appear on screen as it is calculated, from top to bottom. If you're not pleased with the location or appearance of the cloud, type "U" from the key board to "undo" the operation. You can relocate the cloud and click it down again, or experiment with the settings in the Blending Ratio window and check the various results by clicking the brush into place and "undo"ing the operation until you're satisfied.
12. Now turn the original brush into a variety of clouds. Move the crosshairs to the very top of the screen, hold down the right mouse button to expose the Main Menu, move over to the word "Brush," and down the Brush Menu to "➔ Resize," where a sub-menu will appear. Move down the sub-menu to "Halve" and release the button. Allow the program to recalculate the brush. Then return to the Brush Menu as above, and select "Flip"; then "Vert" from the sub-menu. The cloud will appear upside-down. If you select "Horiz" from the Flip sub-menu, the brush will flip from left to right.

    You can experiment with the various functions of the Brush Menu and produce many different sizes and shapes of clouds. If you go to the Brush

Menu and select "➔ Resize"; then "FREE" from the sub-menu, the cloud will reappear with the word "FREE" extending down from the crosshairs. Hold down the left mouse button, and a rectangle will appear, enclosing the volume of the original brush. As you move the mouse, the volume of the rectangle will change. When you think you've arrived at the desired size and shape, release the button; the program will take a minute and recompute the cloud.

Enjoy painting as many different clouds into the sky as you wish before proceeding to the next step: THE BALLOON!

13. Return to the first screen by pressing "J" on the keyboard, or by moving down the Project Menu to "Alternate," and releasing the button while highlighting the words "Previous Page." The "alternate" screen(s) is/are always the one(s) you are not seeing at the moment.
14. Move your pointer into the square showing the Scissors Tool, click the left mouse button ONCE, and move back onto the painting area. Now, position the perpendicular lines at one corner of the large, red and white striped rectangle, hold down the left mouse button, and pull out the resulting box outline until it surrounds the striped rectangle; then releasethe mouse button. A copy of the striped rectangle will now be attached to your mouse's crosshairs.
15. Return to the Project Menu, and, holding down the right mouse button, move down the list to the phrase "Base Colors"; then select "From Brush "by releasing the right mouse button while the words are highlighted.

    This copies the colors used in the brush to the Amiga's color registers. They hold the 16 colors which will be the basis for the HAM calculations used in the painting. This way, we can stamp the brush down without creating any unnecessary (extra) fringe colors.
16. Return to the Brush Menu, move down to the syllable "Lum," and release the right mouse button while the abbreviation is highlighted. The Luminosity requester will appear.

    For this exercise, we'll leave the default Direction setting (set by moving the small grey square inside the black square labeled "Direction"); the light

source is directly in front of the object. "Full scale" is highlighted, and so is "Fine Shade" (default settings) so the full range of brightness variations and subtle transitions will be used to shade the object. We'll only change the intensity setting, so as to make the balloon appear a little brighter:

Position the mouse pointer over the small grey square inside the horizontal black bar labeled "Intensity"; hold down the left mouse button and drag the grey square to the right along the bar until the digits on the left read somewhere from "8" to "10"; then release the button. Now place the pointer inside the "OK" gadget and click the left mouse button. The requester will disappear, returning you to the painting screen.

17. Again, go back to the Brush Menu; move down to "➔ Wrap On," and then to "BALL" on the sub-menu, and release the button. The crosshairs will then be located in the middle of the brush with the word "Ball" extending underneath. Hold down the left mouse button and pull away from the center of the brush; a circle will form, and widen as you move the crosshairs away from the center. The program will stop the enlargement of the circle when the circumference reaches the edge of the brush; you can settle on a circle smaller than the brush if you prefer. When the size of the circle pleases you, release the mouse button. This shape is large, and there are many calculations necessary to 3-D surface mapping with light dependent shading, so there will be a minute or two before the completed balloon appears onscreen.
18. If you are pleased with the balloon you've created, type "K" from the keyboard (or select "Alternate" and "Next Page" from the Project Menu) to return to the other screen containing the cloud filled sky; then stamp the balloon into the picture (remember to leave space underneath for the basket, and turn off the Blend function before you stamp down your balloon!).
19. Type "J" from the keyboard (or select "Alternate" and "Previous Page" from the Project Menu) to return to the first screen containing the construction parts. You now know how to pick up a portion of the picture. as a brush. Pick up the brown rectangle in the lower left corner; it will be used to make the basket of the balloon.
20. Select "Wrap on"; then "Tube" from the Brush Menu. The brush will reappear on screen with the crosshairs attached to the upper right-hand corner; the

word "TUBE" will appear beneath them. Hold down the left mouse button, and the brush will become a hollow white rectangle. Move the mouse to the left in order to set the width of the tube. It can not be any wider than the original brush, so moving the mouse to the right will not change the dimensions of the rectangle. When you are satisfied with the shape of the tube, release the mouse button. A few moments later the new, tubular brush will appear.

21. Type "K" from the keyboard (or select "Alternate" and "Next Page" from the Project Menu) to return to the other screen containing the sky and clouds.
22. Stamp the new brush under the balloon as a basket.
23. Now use the "Lines Tool" to draw ropes suspending the basket from the balloon. On the right side of the Fast Menu are the small grey squares representing the drawing tools. In the upper row, second from the left, is the "Lines Tool." Its symbol is the straight diagonal line. Place the mouse pointer inside the grey square and click the left mouse button, or type "V" from the keyboard to select it.

    This tool enables you to draw a perfectly straight line between any two points on the screen. First, locate the crosshairs of the mouse pointer in whatever spot you wish to begin drawing your straight line; then, continuing to hold down the left mouse button, move the mouse to whatever location you wish to be the end of the line. Notice that you can experiment; moving the mouse all over the screen, and a straight line between your point of origin and your current position will be maintained. As soon as you release the left mouse button, the straight line will freeze into place. Remember, if you are dissatisfied with its position, you can remove the line from the screen by clicking on the "UNDO" gadget before performing any other operation, and try again!
24. At this point you should have a pretty respectable painting of a hot air balloon floating in asky of fleecy clouds. If you would like to save it to disk, observe the procedure which follows the last tutorial.

"JIMMY IT UP!" OR: DOCTORING A DIGITIZED PHOTOGRAPH:

Modifying a photograph by altering the facial features and blending them into the original. Because this tutorial involves use of the interlace (320 X 400) mode, and the spare screen, as well as manipulation of a large area of the picture as a brush, I recommend at least 1 megabyte of memory.

A certain good sport gave us a digitized photograph of himself to use in our demonstrations. We had a lot of fun with it, as you shall see, but apart from that, we discovered some useful and rather sophisticated techniques which might be enjoyed by our users.

Further, we appreciate not only the photograph, but the good natured sense of humor shown by its donor, when he happened by later and saw what we were doing to his likeness; I think he deserves a purple heart! (Doctoring those faces on magazine covers as a kid was NEVER like this...).

In this example we shall practice:

loading a picture with a different screen resolution;
working in hi-resolution HAM mode;
using one face to produce two very different characters;
picking up a portion of the face as a brush, and wrapping it around a 3-D shape;
blending altered features with the rest of the face by using the many shades of color found in a digitized photo.

1. Load the picture from df1: entitled "Jim.pic," by going to the Project Menu and selecting "Load..."; then finding the title of the picture in the window and selecting it, as you've learned previously.

   You will be loading a picture with a higher screen resolution, so a requester will appear which reads: "Change screen size to 320 X 400?"; with a gadget on the left which reads "Yes," and another on the right which reads "NO." Select "Yes" by clicking the left mouse button while your pointer is in the gadget, and the interlace picture will be loaded.

   Three pictures will appear on the screen. In the upper left hand corner will be a digitized photo of a rather pleasant looking person. Notice that the face is not looking directly at you; it is almost a 3/4 view. This allows us to use the

different halves of the face to create two other individuals of unusual, and quite entertaining, proportions! The results of these manipulations can be seen in the other two pictures on the screen. The steps below describe the procedure I followed to produce these effects.

2. Pick up the right side of the normal face (the side which is on YOUR right) as a brush, using the left mouse button so as to leave the original copy in the picture:

   When deciding where to divide the face, choose the area of the nose where the color is the most even from left to right, but as far to the left as possible. This way, when you reverse the brush and line it up with the right side of the face, the nose will be as large as possible, and the flesh tones down the length of the nose will blend more successfully.

3. Go to the Brush Menu and select "Flip"; "Horiz." This will give you a mirror image of the right half of the face; flipped on the "X" axis. Carefully line it up with the right half, covering up the original left half of the picture, and click the left mouse button to set it in place.

   We'll doctor up the left side of the picture, where part of the original left side of the face is still showing, later on in the tutorial.

4. Switch to the alternate screen, using the "alternate; Next page" selection on the Project Menu, or by pressing "K" on the keyboard, and load "Jim.pic"again. We'll reproduce the wide face on the other screen.

   Before you can copy the other half of the face and duplicate it, you'll need to make room by shifting the whole face toward the left. Pick up the whole face as a brush, using the right mouse button so as to pick it up entirely, and move it to the left until the ear is almost touching the edge of the picture.Click the left mouse button to set it in place.

5. Now, pick up the side of the face on your left as a brush, bearing in mind the same considerations regarding the division of shapes and color areas.

6. "Flip" this brush horizontally also; then place it over the right half of the face, matching it with the original left half, and stamp it into place by clicking the left mouse button.

Now you have two very different versions of the same face (an entertaining old trick I once learned in photography class). One face is strange and thin, the other ridiculous and wide. Now let's play with their features!

7. Return to the first screen; notice that the thin face has no ears! In the original perspective, the ear on that side of the face wasn't showing. Go back to the wide face on the other screen and pick up the left ear as a brush, taking care to pick up only the ear and the hair above it; not any portion of that side of the face. Now return to the thin face and attach an ear and some extra hair to the left side.

   You'll need to move the whole face to the left to make room for the ear on the right; so pick it all up as a brush using the right mouse button (so it will be removed from the screen), and reposition it in the center; clicking the left button to stamp it into place.

   Next, pick up the ear on the left as a brush again (using the left mouse button so as not to remove it from the picture), and flip it horizontally to create the other ear; then attach it to the side of the face on your right.

8. The thin man's ears might look more interesting if they had longer ear lobes. Pick up just the lobe of one ear as a brush, then select "Resize"; "Double Vert" from the Brush Menu. When the lengthy lobe appears, position it over the original lobe on the same ear, taking the time to find the position where the colors and shapes blend the most successfully; then reverse the brush and place it on the other ear.

   Careful observation will show that where you divide the area you pick up as a brush makes a difference in how well the altered section will blend with the original when it is re-attached.

9. Now use the left mouse button to pick up one of the eyes as a brush. When picking up the brush, make the rectangular frame around the area of the eye a small square rather than a rectangle, so that the eye will be centered when we wrap it around a ball in the next step.

   Also, make the square as small as you can while still including the entire open eye. This way, you will not pick up any of the eyebrow area, which would be difficult to blend later.

10. Go to the Brush Menu and select "➔ Wrap On" then "Ball" from the sub-menu, or hold down an ALT key while you press "B" from the keyboard.

    The brush will reappear with the crosshairs in the center, and the word "Ball" extending underneath. Hold down the left mouse button and pull outward; a hollow circle will appear; stopping when you reach the outer dimensions of your square brush. Release the button, and the new eyeball will be computed in a few moments. It should look rather bulbous and wide open.

11. "Trans" should still be in effect on the Brush Menu, and the round eye brush will not include any of the background color around the ball. Move the new eye over the original, and locate it in the position where it will best blend with the surrounding colors and shapes.

    You can utilize the Blend setting requester in the FgMode Menu to specify a Blending pattern which will soften the edges of your brush and make them blend into the picture more effectively. Go to the FgMode Menu and highlight the word "Blend"; then move down to the word "Set" which is right underneath. Release the right mouse button while "Set" is highlighted. The "Blending Ratio" requester window will appear. Locate your pointer in the center of the large grey display square (which is in the approximate middle of the requester, surrounded by the various gadgets), and click your left mouse button. The display square and the horizontal and vertical blending graphs will update to show a blending pattern which begins with white in the center, tapering out to black at the outside edges; indicating that the brush will be opaque in the center, and fadeout toward the edges, allowing the background to show through. This setting will blend the outside edges of your brush with the underlying picture, minimizing or eliminating the need to touch-up the edges. Select the "OK" Gadget when you are ready to return to the painting screen.

    When you've positioned the brush to your satisfaction, click the left mouse button to stamp it into place.

    Remember, if you decide you'd rather position it differently after you've clicked it into place, just select the "UNDO" tool on the Fast Menu, or press "U" on the keyboard; then try again until you're satisfied.

12. Now go back to the Brush Menu and select "Flip"; "Horiz" to create a mirror image to stamp over the other normal eye (Later, you can doctor the original face by just exaggerating the more open eye; leaving the other one looking slightly closed, for another humorous effect...:-).
13. Finally, pick up only the two front teeth as a brush; then go to the Brush Menu and select "➔ Resize"; "Double Vert." When the bunny teeth appear, locate them carefully over the originals and click them into place.

    After you've altered the features on each of the faces, the final subject of this tutorial will be blending the new features with the rest of the picture. Since it will apply to every face you'll be doctoring, I've saved it for last to avoid redundancy.
14. Return to the alternate screen, with your wide face in progress.
15. Pick up both eyes together as a brush, including the eyebrows and the crowsfeet. Again, use the left mouse button so that you leave the original eyes in the picture.

    Select "➔ Resize"; "Free" from the Brush Menu. When the brush reappears, the crosshairs will be at the lower right hand corner, and the word "Size" will extend below.

    Hold down the left mouse button, and a hollow rectangle will appear, having the same dimensions as your brush. Resize the hollow rectangle by moving the mouse inward and upward so that the hollow rectangle is smaller and narrower by about 25%. When you think you've made a good guess, release the mouse button and allow the new eyes to be computed.

    You will want to locate the new pair of eyes over the originals so that the crowsfeet can be matched up as if they just continue outward. Don't worry about the original set of eyebrows showing above the new pair of eyes. You'll use the skin tone of the forehead to cover those later.

    Some experimentation may be necessary. If you have resized the eyes too small, just select the scissors tool (or type "B" from the keyboard); pick up the original eyes, and try again.

    Eventually, you will have a new set of smaller, narrower eyes which fit over the originals; looking as if the crowsfeet continue on for about twice their ordinary length.

16. Next, use the left mouse button and pick up the mouth as a brush, leaving the original in the picture.

    Go back to the Brush Menu, and select "➔ Resize"; "Free" again. This time, make the mouth a bit wider and about 25% longer (so that all the teeth are longer, and the mouth is open farther). Experiment, until your new mouth just fits right under the nose, and the lower lip just touches the bottom of the picture. When satisfied, stamp it into place.

    You've now created a pair of very different, and strange looking characters! You can compare your results to mine as you proceed with the final touches.

17. Now you can blend the new features into the rest of the picture so they look as if the original photograph has never been altered. Here are some techniques I've learned:

    I. Use a portion of the face which is right next to the area you want to camouflage; copy that section as a brush, and duplicate it over the area which needs to be blended.

    On the wide face, I used the area of the forehead right above the original eyebrows to cover up the portion which was still showing after I stamped in the smaller eyes. Just pick up an area of the forehead which is about the same length and width as the area you wish to cover; then move it into place and stamp it down. It's amazing how well that section of forehead will blend in above the smaller set of eyebrows. You'll also see a dark, shaded area above the outer corner of each eye, at the temples; copy that and move it down, lining it up to continue the direction of the shaded area; blending the edges of the brush on each side.

    II. Use the magnification window to perform fine touch-up; blending the pixels and matching the colors of adjacent areas.

    On the right side of the Fast Menu are the tool gadgets (little symbols in small grey squares). The third square from the right, bottom row, contains the symbol of a little magnifying glass. Place your mouse pointer inside this square and click the left mouse button to select the magnification gadget, or press "M" from the keyboard.

The little square will reverse colors: dark background with a light grey symbol inside; indicating it has been selected. When you move your pointer back to the screen, it will now be a little magnifying glass. Center it over the area you need to touch up; then click the left mouse button to bring up the magnification window.

When the window appears, you will see a moderately magnified version of the area you selected. Notice the gadgets on the bottom of the frame. Tc increase the degree of magnification, place your pointer over the "+" sign on the left side of the bottom of the frame, and click the left button; to decrease magnification, select the "-" sign; clicking the left button. The minimum degree of magnification can be accessed by selecting the syllable "Min"; the maximum by selecting "Max" and the intermediate degree by selecting "Mid."

If you need to scroll across the magnified area in any direction, select one of the arrows indicated on the right side of the frame, or press the arrow keys on the keyboard. To enlarge, reduce, or reshape the magnification window, place the mouse pointer over the gadget in the lower right corner of the frame, hold down the left mouse button, and move the mouse in whatever direction you wish to resize the window; a hollow rectangle will appear, symbolizing the size and shape you are creating. When satisfied, release the button, and the window will be redrawn.

You can also relocate the window by placing the pointer inside the "drag bar" at the top of the frame, holding down the left button, and moving in whatever direction you choose. When satisfied, release the button, and the window will be redrawn.

Magnification, and referencing what is inside the window to the unmagnified image, will help you to perform fine touch-up on the photo. Notice the subtle variation of color among the pixels. You can imitate the various combinations of colors to blend away the edges of the brushes you placed in the picture.

First, locate the magnification window over an area which needs to be touched up, i.e., an edge of a brush you've set into the picture. Use the

scroll gadgets (arrows on the keyboard or on the right border of the magnification window) to relocate the window over the desired portion of the picture, or click the left mouse button while your pointer is over the "M" gadget on the bottom border of the magnification window; the symbol of a magnifying glass will appear; select the center of the desired area by positioning the magnifying glass, and click the left mouse button. The magnifying window will now display the newly selected area.

You can use the subtle combinations of colors adjacent to the edge of your stamped-in brush to camouflage that edge.

Position the mouse pointer inside the large, vertically divided rectangle to the right of the small color palette squares; click the left mouse button. This is the Foreground/Background Color Display Square. When you move the pointer back to the painting area, it will have the word "PICK" attached to the crosshairs. Move the crosshairs into the magnification window, and center them over a pixel which has a color representative of the surrounding area; click the left button. The left half of the large, vertically divided, Foreground/Background Color Display Square will become the color of the pixel you've just selected, and it will now be your foreground painting color.

Use this color to repaint some of the pixels which compose the edge of the stamped-in brush. Notice the relative proportion of this color to the others around it; when you've created a similar pattern with that color, repeat the process of selection with another of the mixture of colors near the edge of the brush, and continue to repaint the edge with a series of colors from the immediate area until you have blended it in.

Another technique involves picking up a small group of pixels adjacent to the edge of the brush, and wrapping them around an ellipse, thereby eliminating the square corners which can make the pattern too recognizable. This small elliptical brush can be used to blend away a noticeable edge, also.

Another method I discovered as a tangent of the preceding two, is to pick up a small area of the painting right next to the edge I need to blend away; then move it directly over to the edge and stamp it down. Move along the edge to the next area and do the same; using each brush only once. This technique is

slightly more time consuming, but it produces an almost imperceptible blending of the brush with the rest of the picture.

III. Use the Pantograph Source Tool. This tool will allow you to copy selected pixels from one section of a picture to another, or trace portions of a drawing exactly into another area without having to surround them as a brush and move them.

Move your mouse pointer to the FgMode Menu, hold down the right mouse button, and move down the menu to the list labeled "Source"; then select "Panto." Your crosshairs will reappear with the abbreviation "PANT" extending beneath them. Set your pantograph's offset by positioning your crosshairs in the location where you intend to paint, and then hold down the left mouse button and pull out the resulting straight line to the area from which you intend to copy. When you release the mouse button, a double set of crosshairs will appear; the larger set indicates your painting location, and the smaller set indicates your source location. Move the larger set into the area you want to touch up, and begin to paint. You can copy entire areas, or select individual pixels until you are pleased with the results.

To change the offset of your Pantograph Tool so that you can paint from another source location, return to the FgMode Menu and select "Set" from underneath the word "Panto." You can then repeat the procedure outlined above to use another area of the picture as your pantograph's copying material.

I haven't completed the blending process in all of the areas where I've set brushes into the pictures, (had to get this manual finished on time!), but you can see how well they do match without any fine touch-up. With a little more work the changes could be made just about imperceptible.

HINT OF MISCHIEF (chuckle): If one were to doctor a photograph, and then print it out using a Polaroid™ Freeze, for example (which produces a Polaroid photo of your Amiga's screen image), one might produce a rather realistic (convincing!) photograph.

SAVING YOUR WORK:

Selecting "Save as..." from the Project Menu will bring up a window which reads "Save Picture" at the top. Right under this phrase is a black bar labeled "Drawer". A "drawer" is the name of a directory in which paintings ("pictures"), can be saved. The name of such a directory must be entered into this black bar prior to attempting to save a picture to disk.

You can create special Directories (drawers) on your data disk in df1: (the external disk drive) naming them what you will. You'll find detailed instructions for doing so in your Amiga user's manual.

When you click the left mouse button while your pointer is in the "df1:" gadget, the program will examine the disk for any directories (dir), and list them in the large grey requester. Select the drawer (dir) in which you want to save your painting by clicking the left mouse button when your pointer is over the name of that (dir); the names of any pictures already stored in that drawer will appear in the large grey requester, and the name of the (dir) will appear in the black bar labeled, "Drawer".

Now save your picture by entering its name in the black bar labeled "File." Notice that the cursor is already there; when you begin typing, the letters will appear. Then, when you click the left mouse button in the gadget which reads, "SAVE," the window will disappear, and your picture will be saved to disk.

If you have chosen not to create a special drawer (dir) for pictures, or have not created any directories at all on your data disk, the requester will just display the filenames of any brushes and pictures already on the disk, and the name of the disk drive being accessed will be the only data displayed in the "Drawer" bar. In this case, it would be helpful to create an appendix to the filenames which will let you know whether a filename refers to a brush or a picture. I've used the appendix, ".pic" for pictures, or ".bsh" to indicate a brush.

THE ANIM LOADING, PLAYING AND SAVING TUTORIAL:

Loading a previously created "Animfile" stored on the Art and Tutorial disk and then playing the animation. Next, creating a background painting for this

scene and copying it behind each of the 10 frames of animation; then saving the completed scene into another "Anim file".

In this example we will practice:

bringing up the Anim Loading requester;
selecting and loading the Anim file;
playing the Anim;
creating a background painting for the action;
mapping the series of animation drawings onto the background painting;
saving the new Anim file.

1. First, we need to bring up the Anim Loading requester. Move your mouse pointer to the top of the screen and hold down the right mouse button; now move the pointer to the left and highlight the word "Project." The Project Menu will be revealed. Move your pointer down to the word "Load..." and release the button while the word is highlighted; the Load requester will then appear.

   Select the Gadget which represents the disk drive device in which your Art and Tutorial Disk is located (df1:, df2:, dh0:, etc.); if you have only one disk drive, switch your program disk for the Art Disk and select the internal drive gadget again (df0:). The program will read the disk in that device, and the three directories (drawers) on the Art disk will appear in the requester. Select the "ANIMS" directory by locating your pointer over it and clicking the left mouse button once. The directory name will now appear within the black bar labeled "Drawer," and you will see the title of the one entry in that directory, "Colorhorse.anim." Select this title as you did its directory, using the mouse pointer. When the title appears within the black bar labeled "File," select the "Load" gadget on the lower left of the requester, and the loading process will begin.

   A prompt will appear, asking you if you want to "Load all ANIM pages?"; select the "Yes" gadget. If you have no additional pages already in memory (the one main screen is the only one which is active), the loading process will be completed. If you have already experimented by creating one or more additional alternate pages, another prompt will appear, asking you if it is

"Okay to delete ALL alternate pages???"; select "Yes" once more, and the 10 drawings will appear in sequence. When the process has been completed, you will see the last painting in the series displayed on the screen, and the Drag Bar at the top of the Fast Menu will read 10/10; indicating that you are viewing painting number 10 out of a series of 10.

2. To play the Anim file, go to the Project Menu, move down until the word "Alternate" is highlighted; a sub-menu will appear. Go to the bottom of this sub-menu and select "Animate..." by releasing the mouse button while the word is highlighted, or simply press the letter "A" on the keyboard. A small requester will then appear, reading "Page range" at the top; "(1-10)" will appear to the right, indicating the maximum number of pages in the Anim file which was just loaded. The "From" and "To" String Gadgets below will indicate the first page and the last page by default; the default delay period will be "0." Select the "OK" Gadget to commence the animation. You should then see a galloping horse!

3. Now we'll work on a back ground painting for this scene. First, insert an extra page ahead of the first page. Use "K" from the keyboard to take you ahead from number 10/10 to 1/10. I say "ahead" because this animation constitutes a "cycle," in which picture number 1/10 logically follows picture number 10/10, and because the program always advances directly from the last page to the first page. Once you have picture number 1/10 on the screen, select "Insert Page" from the "Alternate" sub-menu of the Project Menu, or type a capitol "J" from the keyboard. You should now be looking at a blank screen, labeled 1/11 on the Fast Menu's Drag Bar. We will use this screen to paint a background for this animation cycle.

   Because this animation is viewed from a three/quarter perspective, a flat background which appears to move parallel to the screen would look incorrect; it would also be quite difficult to create a background which appears to move in three/quarter perspective. My idea was to come up with a relatively simple background which appears to be seen from the same angle as the animation, but does not have to be moving. I chose to paint a simple field of grass, with the horizon line about three/quarters of the way up

the screen, and some far distant hills at the horizon line. I used the FgMenu's Blend requester to design a pattern of blending which would make the grass in the lower left-hand corner appear brighter than the rest, tapering off in two directions (the distant horizon, and the right-hand side of the screen) toward a darker, more neutral shade of green in the background.

First, I mixed the dark, neutral shade of green using the color controls on the Extended Fast Menu. Locate your mouse pointer over the two arrows on the right end of the Fast Menu Drag Bar (in the upper right-hand corner of the Fast Menu). The Extended Fast Menu with its various color controls will then appear. Select a color as your current Foreground Color that you will not want to use in your painting; click your left mouse button inside its palette square. This selected palette square will be changed into the dark, neutral green. On the left side of the Extended Fast Menu are the three Color Selection Squares; these represent sections of a three dimensional cube in which all of the available 4096 colors can be found. Find a dark, neutral shade of green in one of these squares, position your mouse pointer over it; then click the left mouse button. The palette square you selected as your current Foreground Color will now contain this new green.

Next, move your pointer into the Drawing Tool Box (the two rows of small grey squares on the right side of the Fast Menu) and select the Filled Rectangle Tool (third from the left, top row) by placing your mouse pointer in the lower right corner of the square and clicking the left mouse button (notice that the lower right corner shows the symbol of the box to be filled in with a darker grey). When Filled Rectangle is selected, this box symbol becomes solid, and is highlighted in a reverse color scheme. When you move your mouse pointer back into the painting area, your crosshairs will extend to the edges of the screen in both directions. Move the center of the crosshairs to the bottom of the screen, and all the way into one corner; then hold down the left mouse button, and pull the pointer outward; you will see a rectangle which enlarges in the direction you are pulling. Pull it all the way out to the opposite side of the screen, and up toward the top, leaving about one-fourth of the screen black; release the left mouse button. The area should now fill with the dark green. It will become the Background Color for the blending of the lighter shades of green.

Now select "Blend/Set..." from the FgMode Menu. After the requester appears, find the large grey display square which is in the approximate center of the requester, surrounded by the other gadgets. This square displays the effects of the blending settings you perform using the horizontal and vertical graphs, and the other various gadgets. It is also the Bi-directional control; allowing you to locate your mouse pointer within the square, and, by clicking the left mouse button, specify a point at which the applied color or brush will be 100% dominant over the background (opaque). From there, the blending will taper off until the background shows through the applied color or brush 100%. When the display square is used this way, it will cause the two graphs to update, reflecting the settings necessary to create the effect produced by the use of the Bi-directional control.

To create the blending pattern for the field of grass, locate your mouse pointer in the lower left hand corner of the Bi-directional control, and click the left button. You'll see that the display square will update the graphs and display the effect of the new setting. Now find the Dither control, and select the maximum amount of dithering possible by placing your mouse pointer over the little grey rectangle inside the black bar, holding down the left mouse button, and dragging it all the way over to the right until the readout on the left says "15." The display will update to indicate the effect of this new setting. This should help to make the gradations of color look more like grass; blending the transitions between them. Select the "OK" Gadget to return to the painting screen. Notice that the word "Blend" now appears in the Drag Bar of the Fast Menu.

Next we'll paint the field. Find a moderately bright green, select it as your current Foreground Color by clicking its palette square with your left mouse button; then make sure the Filled Rectangle Tool is still selected. Press the HELP key to make the Fast Menu disappear, then locate your crosshairs in the lower left corner of the screen, hold down the left mouse button, and pull out the resulting rectangle until it extends all the way across the screen, and about three-quarters of the way to the top; release the button. The program will take a few moments to calculate and display the blended field of grass. If you want to alter the blend settings and try again, just select the "UNDO" tool, or

press "U" from the keyboard; then repeat the process described above. When you're happy with the blended grassy field (brighter in the lower left hand corner and darker at the top edge and at the right side of the screen), bring up the Fast Menu again by pressing the HELP key. If you have not yet moved the Fast Menu from its default position at the top of the screen, place your mouse pointer inside the Drag Bar at the top of the Fast Menu, hold down the left mouse button, and move the mouse pointer downward to drag the Fast Menu to the bottom of the screen. An outline will appear during this process which represents the Fast Menu; when you release the left mouse button the menu will be redrawn in its new location. The unpainted black area at the top of the screen should now be exposed.

Pick out a soft sky blue from the color palette. Select this blue as your current Foreground Color, then select the Fill Tool (fifth from the left, top row of the Tool Box) Clicking on it once will activate Background Fill; your crosshairs will reappear on the screen with the abbreviation "BACK" extending beneath them. Position the crosshairs inside the black, unpainted area remaining at the top of the screen, and press the left mouse button; this will fill the black area with your currently selected Foreground Color (Background Fill replaces the color of all identical adjoining pixels with whichever color is used to perform the fill: left mouse button, Foreground Color; right mouse button, Background Color). Now you can paint some soft, fleecy clouds into the sky.

Return to the FgMode Menu, and select Blend/Set... again. After the Blend requester appears, place your mouse pointer in the center of the Bi-directional control/display square and press the left mouse button. The display will update to show an opaque white center, tapering off to black at the edges. Remember that white represents the color you will be applying, and black represents the underlying color(s). The dithering control should still be set to its maximum of "15." Select the "OK" gadget to return to the painting screen. Find white on the palette, and select it as your current Foreground Color; then select Free Shape Fill from the Toolbox by clicking your left mouse button twice while your pointer is located inside the Free Draw Tool (first square from the left, top row). The first click of the left mouse button will activate the Free Draw Tool (the squiggle symbol will appear light grey on a

dark grey background); the second click will activate the Free Shape Fill Tool (you'll see a capitol "F" appear in the square instead of the freehand squiggle symbol). Now you can outline a few freehand cloud shapes in the sky, and they will be filled with your currently selected Foreground Color (white); blended over the underlying sky blue according to the settings you performed in the Blend requester.

Another detail you may want to add to the background painting: some distant hills at the horizon line. To do this, I selected a medium grey as my Foreground Color: RGB (Red, Green, Blue) value 555. You can read this value beneath the large Foreground/Background Color Display Square to the right of the small color palette squares. I then added just one more increment of Red, and two increments of Blue (RGB value now 657), adding a slight tinge of purple to this grey, using the following procedure:

The Extended Fast Menu with its various color controls should still be visible under the Fast Menu. If you have removed it by selecting the arrows in the upper right corner of the Fast Menu, select the arrows again to bring it back to the screen. In the center of the Extended Fast Menu are the three RGB sliders; three horizontal bars to the left of the white letters R, G and B. Your currently selected Foreground Color appears on each of the three sliders, between the little white dashes above and below each bar. To increase the Red value one increment, place your mouse pointer inside the R slider, one step to the right of the two white dashes, and click the left mouse button once. The white dashes should move to the right one step, and the RGB value readout should now indicate 655. Do the same to increase the Blue value two increments; locate the mouse pointer two steps to the right of the white dashes on the B slider, and click the left mouse button. The RGB value readout should now indicate 657.

You can now use the Free Shape Fill Tool (which should still be active after having been used to create the clouds) to paint some distant hills. You can just outline the top of the hills, and then release the left mouse button; the program will produce a straight line between the beginning and the end of your outline. The existing Blend settings will soften the edges, making the hills look slightly out of focus; this, combined with the neutral, lavender-grey color

will help to create the impression of distance. I found that by overlapping my freehand shapes, making some hills darker than others, I was able to paint some rather effective mountain ranges which appeared to be behind one another.

Save this page to another data disk (there won't be enough room on the Art and Tutorial disk), following the procedure outlined ahead of this tutorial, SAVING YOUR WORK. You might call it "colorhorseBG." Later, you could develop some foreground elements which cycle into each other; a dirt path right under the horse's hooves which has groove patterns that work into each other, and tufts of grass alongside the path which work into each other in 10 frames. If you want to create a more complex cycle, you can develop 20 frames of background with moving elements, and just copy the 10 frame horse galloping cycle onto the background series twice.

4. Next we'll place each of the horse paintings over the newly created background painting. This is done by loading the background painting page ahead of each page of the horse's galloping cycle, and copying the horse onto the background using Project/ Alternate/Merge To Next.

   The first step, however, is to locate the background painting AFTER the first page of the horse cycle. Highlight the Project Menu, move down to "Alternate" and then select "Exchange Pages" from the sub-menu. A small requester will appear which reads at the top, "Exchange with page:" and a String Gadget with a cursor inside will appear below (indicating that you are to enter data there). Since your background painting is located in page 1, and we want to relocate it at page 2, type the number "2" from the keyboard; it will automatically appear inside the String Gadget. Then select the "OK" Gadget at the bottom of the requester. When you return to the screen at page 1/11, the first page of the horse cycle will now be there. You can press the "K" key to advance to the next page and confirm that it now contains the background painting; then press "J" to return to 1/11.

   Prepare the horse to be merged over the background painting by filling the negative space around the horse with a selected neutral Background Color which is not already present in the horse. The selected Background Color of the horse's page will be treated as transparent during the merging process.

The horse is now surrounded by the color white, but areas of the horse's body are already painted white, so we want the negative space surrounding it to be another color. Select the soft grey from the palette (fourth color square from the left, top row) using your right mouse button, so that it will be considered the currently selected Background Color. Then select Background Fill from the Drawing Tool Box (fifth from the left, top row). Your crosshairs will reappear on the painting screen with the abbreviation "BACK" extending beneath them. Place the crosshairs in the area surrounding the horse and press the right mouse button; the area should fill with grey, leaving the horse's blaze and his legs white. There will be some stray pixels which need to be cleaned up around the horse; select the Free Draw Tool, and carefully paint them grey using your right mouse button. You can also select the Free Shape Fill Tool by clicking on the Free Draw Tool one more time (a capitol "F" will appear in the Tool's square instead of the freehand squiggle) and surround groups of stray pixels with a freehand outline; the outline will fill with grey when you release the right mouse button. You'll notice that on some of the animation paintings of the horse, an enclosed white area will exist between the horse's legs when they are crossing each other. You'll need to fill these "islands" of white negative space with grey separately, and possibly clean up the outline there, too. When this task is done, you are ready to merge the horse over the background on the next page.

Highlight the Project Menu, move your mouse pointer down to the "Alternate"; exposing the sub-menu, and select "Merge to Next.' You'll be taken to the next page, and the program will take a few moments to scan the image of the horse in over the background painting. Your first page will still contain the horse without the background painting (1/11). Press "J" to return to the first page, and select "Delete this page" from the Project/Alternate sub-menu. You will now be returned to the background painting with the first horse on it, and that page will now be number 1/10.

Advance to the second page by pressing "K"; then be sure the same light grey is selected as your current Background Color, and fill the negative space surrounding the horse. When you've finished touching up any stray pixels surrounding the horse (these stray pixels are a remnant of the digitizing

process I utilized to copy my pencil drawings in to the Amiga, and are not created in Photon Paint), select "Append Page" from the Project. Alternate sub-menu; you'll be moved forward to a new blank (black) screen numbered 3/11. You have now created another screen in which to load the background painting before merging the next horse page over it.

Perform the Load operation as you've learned earlier, and bring back the background painting; press "J" to return to the previous page containing horse number 2; then perform another "Merge to Next" operation. You'll be taken forward to the appended page with the background on it, and the horse will be scanned in on top before. Press "J" again to return to the previous page containing the second horse WITHOUT the background; then delete it, and move on PAST horse number 2 WITH the background to horse number three. Append another new page after horse number 3, load the background into it, back up to the previous page, and merge the horse in over the background again. Follow this procedure until all 10 horse pictures are merged onto the same background.

5. Now, let's playback the animation and see how it looks over your new background painting.

   Select "Animate..." from the Project/Alternate sub-menu, or type "A" from the keyboard. When the little requester appears it should already indicate that the animation is to begin with page number 1 and end on number 10; select "OK," and watch the horse gallop on your grassy field! Press the ESCape key to halt the animation.

6. Finally, let's save the finished scene as a new Anim file.

   Select "Save Anim" from the Project Menu. The Save Anim requester will then appear, and because an Anim file was previously loaded, the same drawer and file names will automatically appear in their respective String Gadgets. There won't be enough space remaining on your Art and Tutorial Disk to save the same Anim file with a background included (besides, you may want to use the horse over another background someday!), so use another data disk to store the new version of the Anim file under another name.

If you have only one disk drive, switch the disks and then select the df0: Gadget again to let the program know a switch was made. If you have your other data disk in another disk drive, or have a Hard Drive on which to store the new Anim, select the Gadget representing its device name (df1:, df2:, df0: etc). After the program has read the new data disk, select the name of any directory (drawer) in which you want to store the Anim file; then go to the String Gadget labeled "File" and change the name of the Anim file so that it cannot be confused with the original. The "From" and "To" Gadgets should still indicate pages 1 and 10, respectively.

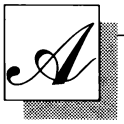
The "Continuous" Gadget should be selected in the event an Anim file is a cycle or loop (picture number 1 logically follows picture number 10). The Anim compression routine economizes on memory by storing only the differences between each frame and its predecessor, so that in order for another Anim playback utility to properly play a cycle, frame 1 must be stored again as the successor to the very last frame. This scene IS actually a cycle, and will need to be saved as a "Continuous" Anim file ONLY IF you will be sending the Anim File to another user to be played back with another standard Anim playback utility. You do not need to save the file as "Continuous" if you will only be loading it into Photon Paint again as a series of 10 pictures which have been stored in compressed form. It will automatically play back continuously whenever you select "Animate...". An Anim file saved without "Continuous" selected will be a slightly smaller file, because page 1 will not have been saved a second time.

Select the "Save" Gadget at the bottom of the requester, and your new version of the horse Anim will be saved to your data disk for you. This process takes a few minutes, because the program will be comparing each frame to the one ahead of it, and performing a compression routine.

So ends the last of the tutorials. I hope they have been helpful.

My experience in the use of this program has been an enjoyable one; I hope yours will be the same!

Heidi Turnipseed.



Appendix

TECHNICAL ADDENDUM

Kickstart/Workbench Compatibility

PHOTON PAINT requires either Kickstart version 1.2 or version 1.3 to run. It won't run under earlier versions.

If you use the PHOTON PAINT program disk to boot your Amiga, you needn't worry about Workbench compatibility, as it comes with Workbench version 1.3 installed; however, if you plan to output to a printer and you are booting from another disk, that disk should have Workbench 1.3. PHOTON PAINT can run under Workbench 1.2, but needs the version 1.3 printer drivers and Preferences to print properly.

The "Constrain" Function

PHOTON PAINT has a "Constrain" feature that is usable in conjunction with many of its other functions. You invoke Constrain by pressing and holding the SHIFT key before and during the execution of the other functions.

In any operation in which you define a rectangle (hollow or filled rectangle, scissors tool, grid definition, etc.), holding down either SHIFT key will force a square to be defined, i.e., it will force equal movements in both axes. The area defined may not look exactly square on your monitor because it is measured in pixels, and pixels on the screen may not be exactly as high as they are wide.

In other operations involving the mouse, pressing SHIFT during a mouse movement will Constrain the movement to the predominant axis of movement during the instant that the SHIFT key was pressed. This is active for most of the free-hand tools, lasso and polygonal cutters, stencil definition, etc.

Installing PHOTON PAINT on a hard disk

To install PHOTON PAINT on a hard disk drive, perform the following steps;

1. Make sure that you have Workbench version 1.3 installed; the program will run under Workbench 1.2, but it must have version 1.3 printer drivers in order to print properly. Please consult your 1.3 Enhancer documentation. The program runs under either Kickstart 1.2 or 1.3.

2. Create a directory (drawer) on the hard disk that will store the program. You may want to create additional, separate directories for storing pictures, brushes, or ANIM files.

3. Copy the program to the directory you created. This can be done from the Workbench by simply dragging the PHOTON PAINT program icon to the disk icon. Alternatively, you can use the CLI to do that. Assuming that your hard disk is referred to as "dh0:" and that you have created a directory named "Paint" on it, the CLI command would be:

Copy PhotonPaint to dh0:Paint

If the PHOTON PAINT disk is not in the currently selected diskette drive, you will have to add the drive name before "PhotonPaint" in the line above.

4. Add a line in the Startup-Sequence file, tnat will assign the name "Photon Paint:" to the path name of your newly-created directory. Assuming again that this directory is named "Paint", the line would read:

Assign "Photon Paint:" to dh0:Paint

(This step is optional; it will enable running the program by double clicking on a picture or ANIM file icon).

5. You may also want to copy the title screen so that it will show while loading the program; do this by using the CLI to copy this file to the directory you created. Assuming the same names as above are used, the command would be:

Copy pp.ip to dh0:Paint

(This step is optional; if you don't perform it, the program will load without displaying the title screen).

Boundary Fill of Large Areas

In low memory situations, or when attempting to fill a very large area, the pointer may display "WAIT" for a few moments, but then return to normal crosshairs without anything else happening. This indicates that the program needs more memory in order to use this function properly. See: APPENDIX B; What To Do When You Run Out Of Memory.

A Note On Contour Mapping

When the Contour Mapping function generates a "wire-frame" model, it uses only a limited number of point samples to generate the model. This is reflected in the density of the lines shown in the wire-frame. You can change the number of sample points used by pressing the "ENTER" key on the numeric keypad, to increase the number of points, or by pressing the "-" (minus) key on the numeric keypad, to decrease the number of points.

B Appendix

What To Do When You Run Out of Memory

PHOTON PAINT uses a memory management routine that attempts to free up the maximum amount of memory available for its operations. However, depending on the amount of memory in your Amiga and the nature of your work, you may sooner or later run out of memory. When that happens, you can try one or more of the following procedures to alleviate the memory shortage:

- If the Fast Menu is open, and especially if its extended part is showing, close it. Although some operations do this for you, some others don't, and this may provide just enough memory to enable the operation.

- As a rule, the larger the screen you are using (the higher resolution it has), the more memory it consumes. So don't use the Overscan screen mode unless you really need it.

- If there are any pages open that you don't need, delete them (using "Delete this page" in the Alternate sub-menu or Amiga-"K" from the keyboard). This will free up a lot of memory.

- If you have used a large font, and don't need it right now (remember, you can always re-load that font), delete it using "Free" in the Font sub-menu (or Amiga-DEL from the keyboard).

- The "Under" Source and the "Pattern" Source used with a large pic-brush, are both "memory hoggers." If one or both are active and you don't need either, revert to the "Normal" Source.

- The Magnify window uses quite a lot of memory (depending on its size). Try closing it if you don't need it.

- The "Keep Brush" option in the Prefs menu prevents the program from deleting the currently displayed (or stored) pic-brush for freeing some memory. Use this option with caution if you don't have at least 1MB of memory in your Amiga. Even if this option is checked and you don't need the stored pic-brush anymore, you can still delete it using "Free" in the Brush menu (or ALT-DEL from the keyboard). Similarly, the "Keep Undo" option prevents the program from disabling the Undo operation when it needs memory; enabling this option may, however, prove necessary as the Undo option is very important in allowing you to perform almost anything with the peace of mind that it can be reversed.

Appendix

SYSTEM MESSAGES

Error, Warning and Information Messages

Can't close Workbench.

The system software couldn't close the Workbench, probably because there are other applications' windows open on the Workbench screen.

Can't get desired font size!

The requested font size was not found. A smaller font was loaded instead. This may happen because there was not enough memory to load this size, or due to an inconsistency between the font "catalogue" (the file that describes what font sizes are available), and the font files themselves.

Can't load brush!

The brush file you are trying to load is defective.

Can't load non-HAM ANIM files!

You are trying to load an ANIM file that is not in the HAM mode. PHOTON PAINT can only load HAM ANIM files.

Can't load picture!

The picture file you are trying to load is defective.

Can't open 'diskfont.library'!
Can't open 'graphics.library'!
Can't open 'intuition.library'!
Can't open 'layers.library'!
Can't open 'mathtrans.library'!
Can't open the printer device!

The program needed one of these libraries or devices, which are disk files that should be on your boot disk, but couldn't find them (or they were defective). Another, rare possibility is that there wasn't enough free memory to open them.

Can't open custom screen!
Can't open window!

This should appear rarely. It appears when the program just managed to load into available memory, but couldn't open its main screen or window because of a memory shortage.

Can't open font!

The font file you are trying to load is defective, or there is not enough memory to load this font (and a smaller size was not found and substituted).

Can't open Workbench.

There isn't enough memory available to open the Workbench. Workbench requires approximately 40K to open.

Couldn't delete file!

The file can't be deleted, probably because the disk is write-protected.

Directory truncated!

The file directory was very long, and had to be truncated. Thus, not all of the files will be displayed in the requester. Try moving some files into another directory.

Error Reading Directory!!!

There was a problem reading a file directory.

Illegal brush size!

In the WRAP ON CONTOUR operation, you have specified a map too small to produce a meaningful result.

Illegal pages range!

In the SAVE ANIM requester, you have specified an illegal range of pages (for example, -3 to 5).

Must have matching screen sizes!

You have either:

1. Tried loading an ANIM file that is not in one of the screen resolutions supported by PHOTON PAINT

OR

2. Refused the automatic screen mode (resolution) change that PHOTON PAINT suggested, and thus it is unable to load the rest of the ANIM file.

Need Kickstart version 1.2 or higher!

You are trying to run PHOTON PAINT using an older version of Kickstart.

No alternate page!

You are trying to perform an operation involving alternate pages, but you haven't opened any.

No brush to be saved!

You are trying to save a PIC-BRUSH, but you haven't created one.

No brush!

You have selected the PATTERN source, but a PIC-BRUSH doesn't exist and thus can't be used for a pattern.

No mem!
No memory for ANIM compression!
No memory for Blend Ratio requester!
No memory for Font requester!
Not enough memory for bend!
Not enough memory for brush!
Not enough memory for contour map!
Not enough memory for cube!
Not enough memory for file requester!
Not enough memory for rotate!
Not enough memory for stretch!
Not enough memory for tilt!
Not enough memory to save ANIM file!
Not enough memory to save picture!
Not enough memory!
Out of memory!

Not enough memory for file requester!

An operation can't be performed due to memory shortage. See; "What To Do When You Run Out Of Memory".

No memory for Pattern!

There is not enough memory for the pattern you specified. Try cutting a smaller PIC-BRUSH.

No memory for Under!

You have selected the UNDER source in either the FgMode or the BgMode menus, but there isn't enough memory for this source. See; "What To Do When You Run Out Of Memory".

No memory to change mode!
No memory to change source!

The source or mode change can't be performed because of a memory shortage. See; "What To Do When You Run Out Of Memory".

Not enough memory for alternate!

This may appear in one of these situations:

1. You are trying to perform an operation that will result in the opening of a new page (such as APPEND or INSERT PAGE or COPY TO NEXT in the ALTERNATE sub-menu) but there isn't enough memory for this.

2. During the loading of an ANIM file, there wasn't enough memory to open another page. Thus, not all of the frames in the file were loaded.

No memory for smooth animation!

Usually, PHOTON PAINT will utilize a second buffer to allow smooth animation. However, when memory is low, the program won't use this method, and animation will be jerky, with some "noise" and "fringes" appearing.

Not enough memory to animate!

There is not enough memory for the Animate operation. You could try deleting a page or two to relieve this.

Not enough memory to run!

You are trying to run PHOTON PAINT on an Amiga that has less than 512K memory installed, or other running programs left too little memory for the program to run.

Picture too wide: xxx

The picture you are trying to load is too wide to be processed by PHOTON PAINT (larger than 1023 pixels wide).

Resulting Brush Size is Invalid!

In a brush operation, you have specified a resulting brush that is either too large or too small for PHOTON PAINT to process.

There is only one page!

You have selected the UNDER source, but there aren't any alternate pages existing.

This is not a drawer!

In the DRAWER gadget of a file requester, you have specified a filename instead of a drawer (directory) name.

This is the only page!

You are trying to delete the only page existing.

Too many planes: x

The file you are trying to load has more colors than Photon Paint can handle.

Unorganized disk error!

A disk error has occured that PHOTON PAINT can't handle.

Unsupported masking type!

An IFF file has a rare attribute that PHOTON PAINT can't handle.

WARNING: ABORTED SAVING ANIM FILE!

You have specifically requested to abort the saving of an ANIM file. Thus, the file will be truncated (on a frame boundary).

WARNING: COULDN'T SAVE ANIM FILE!
WARNING: COULDN'T SAVE BRUSH!
WARNING: COULDN'T SAVE PICTURE!

A save operation did not succeed. The reasons could be that the disk was full, write-protected, not formatted, or otherwise defective.

Wrong disk or drawer?

You are trying to load or save a file from/to a disk that is not formatted, bad, or otherwise defective, or you have specified a directory (drawer) name that does not exist.

Verification Messages

Abort bending?
Abort remapping?
Abort resizing?
Abort rotate?
Abort stretching?
Abort tilting?
Abort twisting?
Abort wrap on cone?
Abort wrap on contour map?
Abort wrap on cube?
Abort wrap on free?
Abort wrap on tube? Abort wrapping on ball/ellipse?
Abort X-flipping?
Abort Y-flipping?

You have pressed the ESC key in the middle of a brush operation. If you really want the operation to stop, click the YES gadget, otherwise click the NO gadget and the operation will continue from the point where it was stopped.

Abort saving ANIM file?

You have pressed the ESC key in the middle of an ANIM file save operation. If you really want the operation to stop, click the YES gadget, otherwise click the NO gadget and the operation will continue from the point where it was stopped.

Are you sure you want to quit?

This message appears after selecting the QUIT menu entry. The program gives you a chance to change your mind about quitting (this is important to ensure that you have saved the picture(s) you have created). If you really want to quit select YES, otherwise select NO.

Clear the screen?

This appears after selecting the CLEAR SCREEN operation, and it gives you an opportunity to change you mind about clearing the screen.

Change screen size to aaa X bbb?

You are trying to load a picture (or an ANIM file) having different resolution than the current resolution. If you click YES, the program will change to the resolution of the file you are trying to load, but this will require the deletion of any existing alternate pages, as well as the current Pic-Brush. This message appears only if the LOAD PROMPTING option in the PREFS menu is checked.

Copy this page to next?

You selected the COPY TO NEXT operation from the ALTERNATE sub-menu, but performing this operation will destroy the picture on the next page. You can click the NO gadget to cancel the operation. This appears only when there are pages following (i.e., higher-numbered than) the current page.

Delete this file?

You selected to delete a file. This message gives you a chance to change your mind and cancel the operation.

Delete this page?

This appears after selecting the DELETE THIS PAGE operation from the ALTERNATE sub-menu, and it gives you an opportunity to change your mind about deleting the current page.

Load all ANIM pages?

You have selected to load an ANIM file. You may now choose to load only the first frame of this file, or all of the frames (as many as will fit in memory). This message appears only if the LOAD PROMPTING selection in the PREFS menu is checked.

Lose alternate page(s)?
Lose brush and alt page(s)?
Lose brush?

When changing the screen mode (screen resolution), the program must delete other pages and the Pic-Brush if existing. These messages inform you of which of these you are about to lose, after the screen mode change is performed. Clicking NO will abort the screen mode change.

Not IFF. Try loading anyway?

The file you are trying to load is not a valid IFF file. If you choose to load it anyway, the program will try to load it as a RAW file (some early demos contained pictures in this mode).

Okay to delete ALL alt pages???

This message may appear in either of two situations:

1. You have specifically selected the DELETE ALL PAGES operation from the ALTERNATE sub-menu. You may click NO if you wish to cancel the operation.

2. You are loading an ANIM file. After loading the first frame, PHOTON PAINT needs to delete any existing pages before loading the rest of the file. If you choose not to delete these pages, the ANIM loading operation will be aborted.

Overwrite existing file?

You are trying to save a file by a name that already exists on the disk. If this is a newer version of the same picture then it is probably O.K. to allow the operation, but otherwise take caution not to destroy an existing picture on the disk.

Appendix

PHOTON PAINT'S FILE FORMAT

1. PHOTON PAINT uses the IFF standard for saving and loading picture and brush files.

2. A PHOTON PAINT picture file is composed of the following chunks:

BHSM — A private chunk which indicates the exact screen mode in which the picture was prepared. The structure of this chunk is as follows:

```
struct ScreenMode {
  unsigned is_lace      : 1 ,
           is_pal       : 1 ,
           is_overscan  : 1 ,
           pad          : 13;
};
```

Each of the above is a bit; when set, it indicates the picture was in this mode when saved.

BMHD, CMAP, CAMG — standard IFF chunks.

BHCP — A private chunk which contains the three lower rows in the fast menu's palette display. This chunk also contains PHOTON PAINT's version number.

```
struct PaletteInfo {
    int Version;            Currently 0.
    int PaletteColors (48); The 48 color boxes in the lower three rows of the palette.
};
```

Each word in "PaletteColors" indicates a color number from 0 to 4095 in the standard Amiga color notation.

BODY - standard IFF chunk.

3. A brush file is identical to a picture file, except for the private chunk BHBA, which replaces BHCP and contains information used by the program to compute its correct color values.

4. Whenever the user performs a "Save Prefs" operation, a file "PP.Preferences" which contains the current settings of several items in the "Prefs" menu is created in the "S:" logical device (usually assign to "SYS:S"). The structure of this file is as follows:

struct pp_preferences {

LONG id;	Identifies this as a prefs file. Should be 'PPPF'.
UBYTE version;	PHOTON PAINT's version number. currently 0.
BYTE fast_brush_n_back_zero;	The least signficant bit (bit 0) indicates the 'Fast Brush' toggle. Bit 1 indicates the 'Clear to First' toggle.
UWORD pointer_ticks;	Mouse speed divider. Uses the same format as the Amiga Preferences values.
BYTE view_x_offset, view_y_offset;	Screen offsets in the standard Amiga preferences format.
struct ScreenMode screenmode;	As in the BHSM chunk above.

The following entries are boolean (flags), indicating whether or not their relative mode was set:

BYTE exact_color;
BYTE keep_undo;
BYTE keep_brush;
BYTE load_prompt;
BYTE coordinates;
BYTE follow_mouse;
}

THE ANIM FILE FORMAT

PHOTON PAINT 2.0 saves and loads ANIM files compressed using the 'Bytes Vertical Compression' developed by Jim Kent. The first frame of the file is stored as a PHOTON PAINT picture (including the private BHSM and BHCP chunks).

To allow PHOTON PAINT to correctly load ANIM files that PHOTON PAINT created for continuous playback, the program stores an additonal, private chunk named 'LAST', as part of the form in which the last 'real' frame is stored. As an example, an ANIM file having 2 frames, and not created for continuous playback looks like this:

```
CHUNK FORM   (  86654) TYPE ANIM
        CHUNK FORM   (  45136) TYPE ILBM
            CHUNK BHSM   (      2)
            CHUNK BHMD   (     20)
            CHUNK CMAP   (     48)
            CHUNK CAMG   (      4)
            CHUNK BHCP   (     98)
            CHUNK BODY   (  44912)
        CHUNK FORM   (   9516) TYPE ILBM
            CHUNK CMAP   (     48)
            CHUNK LAST   (      2) ; this indicates last 'real' frame
            CHUNK ANHD   (     40)
            CHUNK DLTA   (   9390)
```

For comparison, the same ANIM stored by PHOTON PAINT for continuous playback would look like this:

```
CHUNK FORM   (  86654) TYPE ANIM
        CHUNK FORM   (  45136) TYPE ILBM
            CHUNK BHSM   (      2)
            CHUNK BHMD   (     20)
            CHUNK CMAP   (     48)
            CHUNK CAMG   (      4)
            CHUNK BHCP   (     98)
            CHUNK BODY   (  44912)
```

```
CHUNK FORM   (    9516) TYPE ILBM
     CHUNK BHSM   (      48)
     CHUNK LAST   (       2) ; this indicates last 'real' frame
     CHUNK ANHD   (      40)
     CHUNK DLTA   (    9390)
CHUNK FORM   (    5420) TYPE ILBM
     CHUNK CMAP   (      48)
     CHUNK ANHD   (      40)
     CHUNK DLTA   (    5536)
CHUNK FORM   (    8024) TYPE ILBM
     CHUNK CMAP   (      48)
     CHUNK ANHD   (      40)
     CHUNK DLTA   (    8320)
```

Notice that in a file stored for continuous playback, the first two frames are duplicated at the end of the file. The last 'real' frame is thus frame number 2, and this is indicated by the 'LAST' chunk.

This chunk is two bytes long and contains zeros.

KEYBOARD COMMANDS

PROJECT MENU	
CLEAR	DELETE or SHIFT-K
LOAD	Amiga-L
SAVE	Amiga-S
SAVE AS	Amiga-A
SAVE ANIM	Right Amiga-N
DELETE PICTURE	Amiga-D
PRINT	Amiga-P
FAST MENU (toggle)	HELP or F10
ALTERNATE (sub-menu)	
NEXT PAGE	K
PREVIOUS PAGE	J
GO TO PAGE	L
INSERT PAGE	SHIFT-J
APPEND PAGE	Amiga-J
DELETE PAGE	Amiga-K
COPY TO NEXT	Amiga-C
ANIMATE	A
FONT (sub-menu)	
LOAD FONTS	Amiga-T
FREE FONT	Amiga-DELETE
VIDEO (toggle)	Amiga-V
INTERLACE	I (only when VIDEO is on)
QUIT	Amiga-Q
PREFS MENU	
SCREEN MODE	Right Amiga-M
EXACT COLOR	Amiga-E
KEEP UNDO	Amiga-U
KEEP BRUSH	Amiga-B
FAST BRUSH	Amiga-F

BRUSH MENU

LOAD BRUSH	Amiga-O
TRANS BRUSH	ALT-R
SOLID COLOR	ALT-O
FLIP (sub-menu)	
HORIZ	X
VERT	Y
RESIZE (sub-menu)	
FREE	ALT-S or SHIFT-Z
DOUBLE	ALT-D or SHIFT-H
HALVE	H
ROTATE (sub-menu)	
FREE	ALT-Z
+90	ALT-0 (zero)
-90	ALT-9
WRAP ON (sub-menu)	
TUBE	ALT-U
CONE	ALT-C
BALL	ALT-B
ELLIPSE	ALT-E
FREE	ALT-F
CUBE 3/4	ALT-4
CUBE *3	ALT-3
CONTOUR	ALT-2 (see TILT below)
SET AVERAGE	ALT-A
SPECIAL (sub-menu)	
BEND	ALT-N
STRETCH	ALT-1
TWIST	ALT-W
TILT	ALT-T

(Numeric keypad commands for TILT and CONTOUR)

0 (zero) Resets all parameters to zero.

9 Selects Pitch and Roll set-mode.

8 Locks and unlocks Yaw, Roll or the X-position.
7 Locks and unlocks Distance, Pitch or the Y-position.
6 Selects Distance and Yaw set-mode.
5 Resets right-side parameters to 0.
4 Resets left-side parameters to 0.
3 Selects X and Y position set-mode.

LUM	ALT-L
FREE	ALT-DELETE

AND A FEW OTHER THINGS

[move foreground color to the left of current one on palette
] move foreground color to the right of current one on palette
{ move background color to the left of current one on palette
} move background color to the right of current one on palette

RETURN (toggle)	expanded fast menu
ESCAPE	abort for many functions, particularly those that activate the quick menu counter

SPECIAL MENU

CYCLE DRAW	TAB
STENCIL (sub-menu)	
ON/OFF (toggle)	` (under ESCAPE key)
DEFINE	SHIFT- ~ (tilde, under ESCAPE key)
INVERT	I (only when STENCIL is on)
GRID (sub-menu)	
ON/OFF (toggle)	G
DEFINE	SHIFT-G
SHADOW (sub-menu)	
ON/OFF (toggle)	W
DEFINE	SHIFT-W

FOREGROUND MODE MENU

NORMAL	F1
BLEND	F2
SET	ALT-M or SHIFT-F
ADD	F3
SUBTRACT	F4
MAXIMUM	F5
MINIMUM	F6
USE H	F7
USE H&S	F9
AND	SHIFT-F1
OR	SHIFT-F2
XOR	SHIFT-F3

SOURCE (within Mode menu)

COLOR	SHIFT-F4
PATTERN	SHIFT-F5
PANTO	SHIFT-F6
SET	ALT-P
UNDER	SHIFT-F7

DRAWING COMMAND SHORTCUTS

D	freehand draw with current pen size
. (period)	freehand draw with smallest pen size
D-D	freehand fill
S	dotted line tool
S-S	airbrush
V	straight-line tool
V-V	polygon fill
Q	curved line
R	hollow rectangle
SHIFT-R	filled rectangle
E	hollow ellipse
SHIFT-E	filled ellipse
T	text

C	hollow circle
SHIFT-C	filled circle
F	fill tool
F-F	fill to boundary
M	magnify

(magnification subset)

+ or SHIFT-period increases magnification

- or SHIFT-comma decreases magnification

arrow keys scroll the magnified area

B	regular brush-cutter
B-B	freehand brush-cutter
B-B-B	polygon brush-cutter
SHIFT-B	recall previous brush
U	undo
P	pixelize

(pixelization subset)

0 (zero) on the numeric keypad increases pixelization size

- on the numeric keypad decreases pixelization size

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